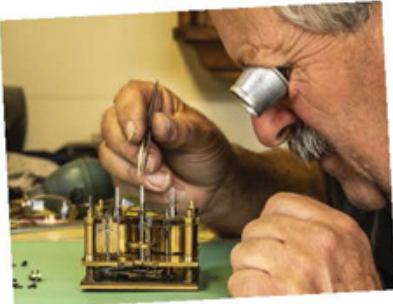




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EPIC KITSET:
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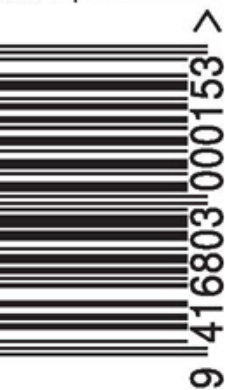
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Human nature is a funny thing, isn't it? We all have our own quirks and fancies.

When *Shed* writer Jason Burgess contacted me and said that he had stumbled across a couple of blokes who restore and collect stationary engines, and would I be keen on an article on them, I could hardly contain myself. Would I? Would I? You bet your bottom dollar I would be. He was rather taken aback with my enthusiasm for the subject and wondered whether I was having a funny turn.

The thing is: I can still recall the moment about 30 years ago when I first fell under the spell of these beasties. It was my first visit to the McLeans Island Swap Meet in Christchurch and I was wandering around — as you do — enjoying the incredible array of parts and bits and pieces on display for sale. I turned a corner and was stopped in my tracks.

In front of me was an extensive display of engines by the local stationary engines club; all different sizes and colours, and each with its own purpose and personality. I was hooked.

These mostly small machines appeared to be such soldiers, performing their tasks with ease and real enthusiasm. You can tell that I instantly saw personality

in these guys. Reliably chugging away, seemingly independent of any human involvement, and just getting on with their job with no fuss. They appeared like robots.

Now, all these engines would once have had a task to perform, and would have been attached to an arm or a lever, but these guys were all free of the jobs they were designed for and were like animals set free from a zoo to just be themselves — no cages, no one to boss them, no real work to do. It's as if these engines had moved to a retirement home and were rejoicing.

So, whenever I come across one of these engines, be it a big diesel generator in a Barrier Island bach or a wee petrol-driven pump, I am in boots and all. It's probably also that they are from another far simpler age, and that appeals to me in this super-fast digital age we are now living in.

Jason has finally accepted my gushing, and I hope a lot of readers enjoy learning more about stationary engines and the thoroughly fascinating passion that these two sheddies have for these engines.

If I ever brought one of these home to my own shed, the look on my wife's face would be priceless. It's almost worth doing that just for a laugh.

“What on earth is that?” 🤖

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THE OLD IRON DISEASE

A pair of Westie collectors bringing new life to vintage machines

By Jason Burgess Photographs: Jason Burgess



Tom Gregory and Gary Norton beside Tom's 1918 Lister L, sourced from his Uncle Arthur. For many years the L powered a shearing shed



Tom's happy place is a shed full of stationary engines

There is something endearing, almost comical, about the chugging, spinning, and belching machinations of vintage stationary engines.

These early exemplars of internal combustion technology sit like naked towers of component parts jutting incongruously from oversized flywheels; everything in plain sight. Sometimes fuel tanks, exhausts, filters, and pumps look as if they have been bolted on as an afterthought. While function definitely trumps aesthetics, design wise their rounded lines still have a charm of their own. Far from being relics, in the right hands these low-tech workhorses can still provide reliable and economical power sources for all manner of tasks. There is a global fraternity of enthusiasts devoted to collecting and restoring them for future generations; these fans of forgotten machinery are said to be infected with the 'old iron disease'.

Neighbours Tom Gregory and Gary Norton are two such afflicted aficionados. While there is a generation between them, their passion is equally contagious.

Dreams about engines

One might be forgiven for thinking that Tom Gregory was born with petrol in the blood. He says he sometimes dreams about motors, particularly ones with provenance; think old-school V8s, early tractors, old Seagull outboards, and his shed full of vintage stationary engines.

Tom reckons he has always been mechanically minded, but he particularly loves "the external stuff, where you can see how everything works". He believes he contracted the iron disease as a young boy when he figured out how to crank start his dad Jeff's JAP 500cc, single-cylinder, side-valve, rotary hoe.

"The JAP was a bugger," says Jeff. "It used to stop a lot; Tom was intrigued. One day, when he was about eight, he

got it started by himself and took it for a walk" — the rest, as they say, is history.

Strong roots

The Gregorys have a rich pioneering history in and around Mahurangi and north-west Auckland; Tom's forebears were some of the first bushmen to work the region's kauri. They still have tight links to those areas, as do many of Tom's stationary engines, which have connections to both the family and their location. Many of his engines hold special memories. He says he wants to get them going while "the sun is still bright in our hearts and we still have that great generation around us".

Tom definitely channels his forefathers' frontier pragmatism; he is self-taught but

"One might be forgiven for thinking that Tom Gregory was born with petrol in the blood"

acknowledges a little guidance from Jeff along the way. He prefers to get his engines running well, before worrying about the paint job. As a way of future-proofing, he prudently stockpiles parts. When needs must, he shamelessly improvises. He tackles each new engine project — no matter how seized it is — with a veritable can-do attitude. You might say his shed is the place where rust comes to sleep.

Engine rhythms

Tom calls his engines ‘breathing beasts’.

“They have their own sets of lungs and unique characteristics; they have a soul.”

Once he gets the timing right, he reckons the real satisfaction is listening to their distinctive rhythms.

“You don’t get that with modern stuff; it all is too common and sounds like a sewing machine.”

Tom currently has a 12-strong assembly of stationary engines, most in working order and others in various stages of repair. Also on his TLC to-do list are two tractors: A Ford N and an OC3 ‘crawler’. At the time of writing he had

“These early exemplars of internal combustion technology sit like naked towers of component parts jutting incongruously from oversized flywheels”

just finished restoring a ’47 Ford Jailbar pickup, flathead V8 — a 13-year project, which was in for its compliance checks.

He says the two engines he has learned the most from are Jeff’s JAP, which he still has, and a 1.5hp 1920s Novo, made in Michigan, USA, which belonged to his late uncle Graham Anderson, but was sourced from his Aunty Joyce’s shed.

The pig

“We think this one powered a DC generator or water pump at Rosedale, a former guest house up at Mahurangi,” Tom mentions. “I call it the pig because when you turn it over it snorts like

a pig. The intake valve rattles when it builds up the atmospheric pressure that pulls the fuel in from the carb. The fuel tank is right at the bottom; there is a fuel plunger that pumps the fuel up. Oil sits above it behind a segregated wall. I didn’t touch the magneto. Me and my mate Harley got it going when we were 13 or 14. We made up a brew of petrol and oil — more petrol than oil — got it smoking, and it kicked into life.”

The exhaust is a one-inch water pipe but Tom reckons that will be replaced with a home-made pepper-pot muffler replica. Everything else is original. ▶



The 1.5hp Novo which once powered a guest house in Mahurangi



Fuel line details on a Lister

“They have
their own
sets of lungs
and unique
characteristics;
they have
a soul”



A place in history

The humble gasoline-powered stationary engine is an unsung hero of the Second Industrial Revolution, which paved the way for modernisation right into the mid 20th century.

Before electricity and the inception of national power grids, stationary engines equipped factories, mills, and farmyards with a means to generate their own mechanical power using gear trains, belts, clutches, and line shafts. They provided the energy to pump water, drive machine tools, saw wood, and cut and process crops.

These petrol and diesel engines were relatively inexpensive, easy to install, and could be operated at short notice to meet demand. After WWII, the flick-a-switch convenience of electricity led to the demise of stationary engines but they churned on in the rural sector for decades. Until recently, it was often possible to salvage an abandoned engine from long grass in a back paddock for next to nix, but they are not quite so easy to find in the wild these days.



“I’d like to get another hopper barrel as a spare. I repaired the hopper barrel with Knead It about 12 years ago. It hasn’t leaked ... but!”

Chicken coop JAP

A subsequent rummage through an old chicken coop at Auntie Joyce’s led to the discovery of a second JAP hoe, which had been stored for years.

“Water had got in and seized the valve,” says Tom. “Nobody was interested in it. We got it home and pulled it all apart, gave her some new gaskets and

rings, and luckily she lives again.”

A taller Lister 3/1 diesel — another from Uncle Graham’s cache — is thought to have powered the old boarding house at Scotts Landing.

“It hadn’t been running since the ’60s,” says Tom. “I have never pulled the head off. The injector line was missing so we gave her a birthday and bought a new injector.”

A cooling tank was fashioned from an old Shell petrol tin. Jeff’s original Royal Enfield spanner, saved from one of his former rides, was found to fit nearly all

the bolts. A new O-ring water seal and spare were sourced from the Old Timer Engines website: oldtimerengines.com.au, an Australian company that stocks new Lister parts.

Lister L

One of the prize pieces in Tom’s collection is the Lister L (larger one), circa 1918.

“We got this from my Uncle Arthur. It used to run a woolshed. I call it the big block: four-horsepower, side-valve piston, with a 5.5 inch bore.” ▶



Tom positions a new pepperpot muffler destined for a Lister J



Lubing the valve springs before start up



Tom and his dad having a yarn next to the Lister L and its distinctive triangular radiator

The machine runs on unleaded 91 and, according to Tom, is very economical. Its most distinguishing feature is the external triangular radiator and copper vat. Instead of using a thermo-syphoning system, whereby the heat naturally rises, the L has a brass water pump at the base of the engine.

“This is quite advanced for its day,” says Tom. “Even Model Ts didn’t have water pumps. The pump pushes water to the top and then it trickles down the radiator gauze into the vat [and] is continually cycled to keep the engine cool. Once the L is running, it puffs a bit of blue smoke. One day I richened it up

Feeler gauge and sundry engine spares



“I richened it up on the carburettor until it was chuffing away, smoking out a rat from the top plate of the shed”

on the carburettor until it was chuffing away, smoking out a rat from the top plate of the shed. I’ve never seen that rat again. I’m into steam trains, too, so I don’t mind a bit of smoke!”

Bush improv’

The L is conveyed by means of Arthur’s original, hand-built totara skid, to which Jeff added four Bren gun carrier wheels.

“Dad dragged them out of the tide at Aunty Joyce’s,” Tom explains. “They had

been used for launching a dinghy. They still have their original grease cups. We had to adapt some angle iron for the axles. A Bren gun collector would probably cry about this, but at least they are saved.”

The original fuel tank was a “bit patchy”, so Jeff brazed up a new one from an old copper Zip hot water cylinder. The home-made crank handle is a repurposed water pipe. The goat-hide belt on the water pump was handmade by Arthur, who shot the goat and cured the skin in the 1980s.

“Uncle Arthur is 95 and still going. He worked as a commercial culler in the ’50s and ’60s; he shot deer the size of cows and wore out two sets of knees.”

The elusive engine

Tom says maintaining the collection takes up a lot of time and space. While he does not want to forgo his other projects, he says he would make room for his ultimate piece: a Blackstone horizontally opposed engine. ▶



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The flick mag and fuel line delivery and drain of a Lister L



Feeler gauge and valve spring spare



Tom's workstation

“They are more heavy duty, burn crude oil, and were used for power generation, pit saws, and large-scale factories. They are less common. I’m not sure I want one in a million bits; I don’t want to start casting — I can do it, but it costs money. You have to find a balance in how much you want to spend, so it doesn’t take the fun out of doing a project.”

At the front of Tom’s shed is a 3.5hp Lister J (Junior) in Lister’s distinctive Brunswick Green colour. Tom reckons it is from the late 1920s or early 1930s.

“I got it from Gary Norton. The timing was out so I got that sorted. I will make a new pepper pot muffler, but it sounds pretty good as it is.” He says he has a brass water pump that any of these

motors could power and cites Gary and his wife as inspiration for potential future projects. The Nortons still use their engines to mill food for their animals and for doing heritage shows.

“I have a maize grinder here,” Tom says, “and eventually I want to start making cornflour and doing things like that — a bit of fun every now and again; useful fun.”

Another rotary hoe

As with Tom, Gary’s story begins with a rotary hoe: a 1936 Howard 8 air-cooled hoe, to be exact. He found it outside the Birdwood Road car dump when he was about 17.

“I saw it and thought that it was too good to be scrapped. I rang up and asked if I could pick it up. That is where it started,” Gary explains.

“One day, when he was about eight, he got it started by himself and took it for a walk’ — the rest, as they say, is history”

With his first rotary hoe in the shed, he decided a mower was needed to go with it.

"I bought an Allen Oxford auto scythe. After that, a Ransomes 'crawler' tractor, then it just took off."

Gary says he prefers restoring just for the enjoyment of doing it.

"It's like painting a picture. Once you have finished then it's part of you. I have collected so much stuff I couldn't scrap,

"I have collected so much stuff I couldn't scrap, because once it's gone, it's gone"

because once it's gone, it's gone."

Gary is the proverbial jack-of-all-trades. He has worked in sawmills, milked cows, driven HIABs, and for many years was a maintenance man for the

Auckland Hospital Board. He currently runs a small farm with his wife, Raewyn, adhering as much as possible to traditional ways. They raise chickens, pigs, and cows.

In life, Gary says, "I have followed my nose. It's the best way to do it. You have to be able to do anything on a property like this. It's a lot of fun."

His shed is somewhere between an overstocked museum back room and a busy automotive workshop. Here, ▶



Jeff's original Royal Enfield spanner, the universal tool for Lister 3/1 diesel. Right, A parts bath



An assortment of magnetos from Tom's collection



Hopper-cooled
Novo with Tom's
braised patch

Gary on collecting stationary engines

There are lots of brands, and some collectors like one engine from each maker. You can have so much fun with them; they are so robust. Over time, they may need a new set of rings or a valve grind but you can just tinker as you go.

They are really versatile; you can run virtually anything off them. Depending on the desired use, you can vary the speed by adjusting the pulley size — small for high speed and less power; large for more power; one motor for all your accessories, like a Kenwood mixer. You can run meat grinders, water pumps, flour mills, saw blades, shearing machines, threshing machines, drill presses, compressors, lathes, as well as provide the illumination for said operations. One engine and you choose what you want to drive off that engine.

Make sure the engine is complete because a lot of the time it's hard to get parts for them. This is a big thing now. One of the first things to do is to make sure it's got a magneto and that the mag is in good knick. Mags are hard to come by, because some people just collect the mags and carburettors and take them off the engines. You can get new parts



Gary behind some of his rotary hoes that are on Tom and his mate Harley's wish-lists

for Listers; they are now made in India — often from scrap metal, so you have to watch that. You are better off finding old parts and reconditioning them.

If it turns over it's a doozy. If it doesn't, it is not a major because sometimes they can be frozen but not properly seized.

What to pay

I don't really go by price but it is a reasonably inexpensive hobby; you could pick up something decent for about \$400. The price

is governed by how complete it is, its size, and how rare it is.

A hit-and-miss engine is worth more than a diesel engine. A hit-and-miss is a beautiful engine: exposed cranks, the whole shebang. It is something wonderful to look at. You can see all its workings. If you have a diesel, all you have is two flywheels spinning round. With a hit-and-miss, you can see everything going around. It creates more interest. People get mesmerised watching these things working. The more moving parts you have, the more people sit there for hours watching them.

Once tuned, a stationary engine runs on the smell of an oily rag. I can run a diesel for two days on less than a litre of fuel. A lot of the power is in the weight of the flywheels. There is an initial force to get it going, but once it is going all the gears drive it; the engine just keeps it going.

As an example, the Lister J (petrol) hit-and-miss engine only fires when the rpm slows and it needs another shot to keep it going. When this happens, a flap in the carburettor opens to fire up and get the momentum of the wheels moving again. Cheap as chips to run; very clever technology. All we have done with petrol and diesel motors has buggered it all up!

crowded passageways pass between tools, toys, deconstructed car bodies and parts, signage, mannequins, life-size dioramas, and, of course, stationary engines.

"I like variation. I don't have a shed full of one thing. I like dirt, growing, machinery, and engines — and, with what's going on in the world, I just want to come out to my shed."



Checking the fuel feed / drain on the Novo

This machine is dangerous!

Gary believes history is going "down the gurgler". Emissions regulations and compliance issues are making it difficult to keep old technology alive.

"At shows," he says, "I like to demonstrate how stuff was done in the old days. I sometimes mill maize, but I have had complaints about the noise and

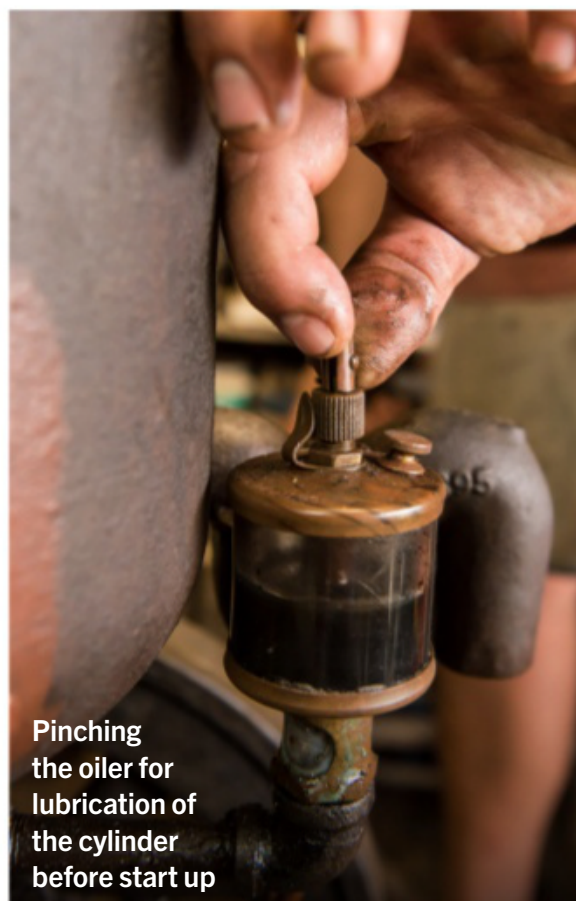
dust going on cars. At one show, I was using the stationary baler and I heard this guy screaming at me. He says, 'This machine is dangerous.' He was off to get my site shut down. I go there to teach and entertain but then you find yourself up against people in orange jackets walking around like gods!"

The Booth MacDonald stationary baler is the rarest piece in Gary's shed.

"It was made by the Land Girls' [Women's Land Service] in WWII, when the blokes were off fighting. It's a beautiful toy. When I first saw it in Taumarunui, it was nothing like the photos on Trade Me; they must have photographed it on a good day. It was rotten. I more or less made it new again, except for the castings. During the war, these things were slapped together, so nothing was square. I like things done properly; it's nice and square now!"

The 2.5hp engine is a New Zealand copy of a Fowler (Leeds). Balers were towed into the field, then started. The hay was delivered to the bailer by horse, then forked in and tied off in bales by hand.

"It's quite a machine when it's going," Gary says. "It has an active arm going up ►



Pinching the oiler for lubrication of the cylinder before start up



A vintage Bentall grinding mill from Gary's collection



A carburettor for a Booth MacDonald opposing engine

“I put some petrol in it, bang on the fuel pump, and she’ll just rattle along. I wonder if your mower will be going in 100 years?”

and down. With two fellas forking and one baling, you could probably crank out 40–50 bales an hour.”

Piha pump rescue

There is no inventory for Gary’s stationary engine collection, but let’s just say he has a few. The oldest is a Lister L 1912, similar to Tom’s with the triangular radiator.

He says, “It is advanced technology for its time. It has a decompression valve so that you don’t crank the engine with full pressure, which makes it easier to start. I put some petrol in it, bang on the fuel pump, and she’ll just rattle along. I wonder if your mower will be going in 100 years?”

Another of Gary’s Listers was used for years as the generator at Whatipu Lodge. He bought it off Auckland Council. One lodge manager saw it in use at a show and told Gary that he wished the lodge still had it.

“I still give it a crank because we use it for our chicken incubators,” Gary mentions.

Years ago, an old surf-lifesaving buddy of Gary’s found a MacEwans water pump up in the bush in the hills near Piha. One day, at the end of a training exercise, said mate managed to divert a rescue helicopter over the pump so that he could lift it out.

“Hard case,” says Gary. “In the old days, they got it up there with no problems, but now we have trouble getting these things down.”



The 2.5hp Booth
MacDonal opposed
engine undergoing
cylinder head overhaul



Gary's 1912 Lister L has a decompression valve so that you don't crank the engine with full pressure, which makes it easier to start — advanced technology for its time

The full monty

The largest accessory in the shed is a belt-driven, Andrews and Beaven chaff-cutter, which is over 100 years old and was saved from an overgrown garden where Gary was making a delivery.

With no manuals to go by, he carefully stripped it to the bare bones, measuring each piece as he proceeded, and making templates of everything. He slowly put it back together, replacing the bulk of the framing, recasting all the gears, and redoing the pulleys.

"It's like a brand-new machine," he says. "I haven't played with it yet but I'm dying to."

Gary has a dream of running a complete display of old farm technology,

but to date a threshing machine has eluded him.

"If I could find one to restore," he says, "I could do the whole monty: thresh the oats through the chaff-cutters then have someone grind the oats. I love the process. Same with maize: strip the kernels, grind them, put the maize through the chaff-cutter or on to the bailer. It is the way things were done. It gives me a buzz when I see people enjoying it; I love to yak about it, too!"

"It gives me a buzz when I see people enjoying it; I love to yak about it, too"

Sharing the passion

"Old shit is good shit," is Gary's motto. He says, "I just love the way stuff was made in the old days. It's fun, enjoyable, and easy to fix."

While he reckons he could happily live back in the '30s and '40s during peacetime, he does admit he is not averse to trawling the internet and learns a lot from watching YouTube videos. After five decades of collecting, he says he is only now starting to offload items.

"I'm hoping that young guys like Tom can inject some more life into these things. There is only so much I can show. If they can show them, too, then we might get people more interested in these things." 📺

Clubs

VERA (Vintage Engine Restorers Auckland) is based in Auckland. Check out its Facebook page or contact veraclub@gmail.com.

The Case and Vintage Farm Machinery Club was founded in Canterbury in 1968, and has members nationwide. It also has a good links page to clubs nationwide. nzwintagemachinery.com

For Lister parts: oldtimerengines.com.au



The 2.5hp WWII Booth Mac engine built by the Land Girls

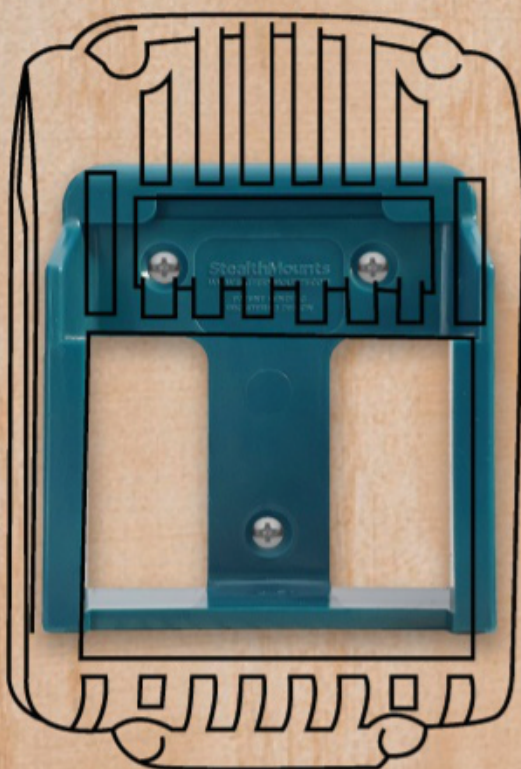
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THE BEST NEW TOOLS OF THE PAST 25 YEARS?

Woodworking tools — will these suggestions tick your boxes as the most innovative inventions of your 'sheddie' career?

By Ian Parkes

Rather than looking at what's new this month, we have decided to take a little look back. Scanning the internet the other day we came across various lists of the best new woodworking tools. There are lots of 'top 10' lists on the internet for the best woodworking tools of this year, and previous years. Quite a number focused on power tools but we wanted to be a bit more inclusive in a list of our own. We wanted to consider the innovations, the tools that have changed the way woodworkers work — the innovations that most people would recognise as new during the span of their woodworking careers. Here's our fairly random selection of 10 innovations over the past few decades. We'd like to hear your views. What would you nominate as a scandalous omission on our part, or as something you think lots more people ought to appreciate more, or even find out about? Email the editor at editor@shedmag.co.nz.

The sliding compound mitre saw

As well as being conveniently portable, this innovation, credited to Hitachi, made a simple drop saw seem pointless and has largely replaced the traditional radial arm saw.

Pocket hole jigs

This invention is credited to American tool and die maker Craig Sommerfeld, who made a jig to drill holes at an angle into the back of a frame, keeping the face clean. It has enabled thousands



of hobbyists and professional cabinet installers to make nice square joints quickly and easily.

Biscuit joiners

Even more discreet is the biscuit joiner. These have been around since the '60s but they have become a lot more common and affordable since the '80s. We can add into this category the various other, more-sophisticated, deep-pocket tenon joiners but they are more expensive and less common.



Dust collectors

For decades dust and shaving vacuum systems were the preserve of commercial workshops. As awareness of the danger in fine wood particles has grown, manufacturers have stepped up to produce affordable dust extraction units for home workshops and toolmakers have incorporated extraction ports to suit.



SawStop table saw

Many lists included this and it's too good to ignore. Surely you've heard of these, or seen the demo in which the inventor puts his finger into the spinning saw. It detects the electrical current on his skin and stops instantly. The electrical contact fires an aluminium block into the saw, stopping it dead. You can simply wipe the sweat off your brow, replace the block, reset the saw, and carry on.



Quick-grip clamps

Traditional screw clamps are utterly wonderful, but how many times have you felt you needed another one and didn't have a spare hand to apply it? A one-handed pistol grip trigger action clamp is a beautiful thing, and using one always saves time.



Cordless tools

Need we say more?



Velcro-backed sanding discs

Not the best tool for many sanding applications, but their prevalence in hardware stores suggests almost universal adoption.

The multitool

A development of the creator of the oscillating saw, German manufacturer



Fein, this tool was invented for the removal of plaster casts without cutting off patients' limbs. Almost every power-tool maker now offers versions of these Swiss Army knives of the power-tool world for cutting, scraping, sanding, and polishing.

Laser measuring tools

Some say that once you've used one of these you can never go back. They don't always work with small or soft targets, but they measure length without the worry about bend or sag in a metal tape or the need to have someone to hold the other end. They measure angles, calculate area, and remember measurements — all very useful.



THE SHED ONLINE

What's happening online at the-shed.nz?

Every week we upload new content onto The Shed website to add to the hundreds of articles and videos already on the site for readers to discover, learn from, and enjoy. Some uploads of the past few months include:

Recognise and use the correct names and styles of common screw-thread fasteners

<https://the-shed.nz/hexagon-head-bolt-or-cheese-head-screw/>



Build a grandfather clock case

<https://the-shed.nz/build-a-grandfather-clock-case/>



As tough as steel

The chemistry of steel determines why and how it should be tempered
<https://the-shed.nz/as-tough-as-steel/>



Build a water wheel for interest or to generate your own electricity

<https://the-shed.nz/spinning-wheel/>



What did we miss?

Many favourite gadgets vied for position here but we had to keep our heads up, which made us realise what else we'd missed.

One of the biggest changes over the past 25 years has to be the increase in availability of a vast array of woodworking tools and equipment for the home user. Versions of many professional workshop tools, such as thicknessers — something else we wanted to put in the top 10 — have been downsized or refined and manufactured in sufficient volume to make them affordable for home use. The quality of the better versions of this machinery has reached a pretty high standard. That development should probably have been included in the list. However, if we do that then we also need to include the greatest innovation over recent decades, which has transformed life for hobbyists and shed dwellers: the internet. The immeasurable amount of information and how-tos on every subject has made it possible for millions of people to conceive of new projects and learn arcane procedures at their whim. It is the greatest tool of all.

WHAT IS THIS?

The Shed readers reply to “What is this?” from issue #103 and it’s an almost unanimous call, it’s a Peg Bar. Here are a few of the dozens of replies we received.

Hi,

In response to your request in the latest edition, as you see in the attached pic I have several of these in my shed. We called them peg bars and they were used for surveying — often as the soil may not be soft enough to drive in a peg so we used it as a crowbar to create a hole, then you could use the other end to drive the peg in. This was okay when you were near your truck, but no fun if you had to carry them any distance along with the rest of your gear! Probably not so needed these days with GPS, but site pegs can still be useful.

Also if you’ve ever seen one of those big circus tents go up, they used similar large pins like this to hold all the guy ropes.

Cheers,

Jon Mason

Thanks for a great magazine. I enjoy interesting, quirky items like this.

To me, the tool/object appears to be a surveyor’s (more precisely a ‘chainman’s’) peg bar.

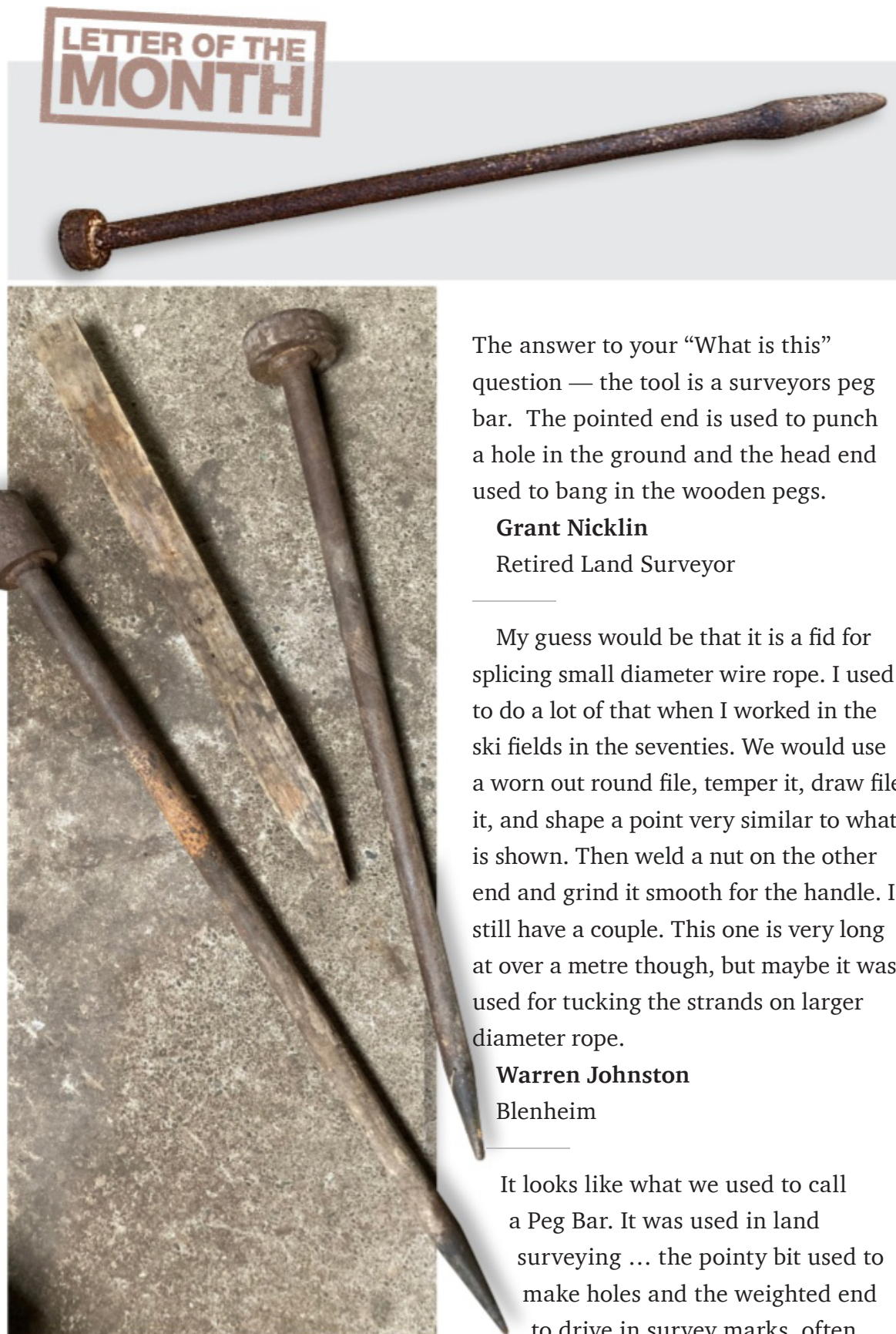
Back in its day the tool was used by the surveyor’s assistant (chainman in that era) to, firstly, use the pointed end to drive a hole in which to place a wooden peg, then to hammer it in using the broad end.

Such pegs would be permanent ones like your common boundary peg, or for ‘change points’ during a survey or levelling traverse, etc.

The peg bars were often made by a local workshop (like the Ministry of Works) to whatever size and specification seemed reasonable. This example appears to be a quite large and heavy version compared to the ones I used in the Ministry of Works. This may be an explanation for it being ‘accidentally’ left on site — by a chairman tired of lugging it around and angling for a less heavy replacement!

Best regards,

John Fenwick



G'day Brian,

The tool is a surveyor’s peg bar. These are used for driving in survey pegs much more efficiently than using a hammer. This is because the driving force is delivered more vertically than with a hammer blow, which naturally is part of a curve. This leads to less splitting of the peg and is also much more efficient. I have made many of these peg bars over a lifetime of earthmoving but somehow they always seem to disappear?

The ones I make up are made from hollow galvanised pipe of a suitable diameter with a cold chisel welded in for a tip. The striking head is just made from a 100mm circle gas cut out of 25mm plate. Works well, until they move on somehow?

Eric Parkins

The answer to your “What is this” question — the tool is a surveyors peg bar. The pointed end is used to punch a hole in the ground and the head end used to bang in the wooden pegs.

Grant Nicklin

Retired Land Surveyor

My guess would be that it is a fid for splicing small diameter wire rope. I used to do a lot of that when I worked in the ski fields in the seventies. We would use a worn out round file, temper it, draw file it, and shape a point very similar to what is shown. Then weld a nut on the other end and grind it smooth for the handle. I still have a couple. This one is very long at over a metre though, but maybe it was used for tucking the strands on larger diameter rope.

Warren Johnston

Blenheim

It looks like what we used to call a Peg Bar. It was used in land surveying ... the pointy bit used to make holes and the weighted end to drive in survey marks, often ‘4 x 2’ timber pegs. Usually made as one-offs, they varied a little in length and diameter etc. I first used one some 40 years ago as, what was then called, a ‘chainman’ and after using it for days on end, you tend to remember these sorts of things!

Regards, **Kevin F Tansley**

The tool on page 27 of *Shed* issue 103 was used by surveyors to install survey pegs. The chainman would be given the location for the peg, he then forms a hole with the pointed end, places the wooden survey peg in the hole, then upends the tool and drives the peg home.

The tool is a hole-making spike and hammer all in one. That’s what it looks like to me.

Cheers, **Stewart Coutts**

Hi,

It looks like a surveyor's peg bar. You thrust the pointed end into the ground, wriggle it around to enlarge the hole, then withdraw it. Place the pointed end of a survey peg in the hole and drive it in holding the bar vertically using the fat end of the bar.

Steve Skinner

This is called a peg bar or a pig bar. It's used to make the hole for a survey peg, they got the name pig bar I am told because someone killed a pig with one — you can still buy them from Ian Neilsen in Auckland.

Rudi Buchanan Strewe

I can be positive that it is a surveyor's tool used for installing pegs on survey points when marking out boundaries. Note the point is to establish the hole location of the peg and the staved end is used as a hammer for driving the peg into the ground. Good find.

Kind regards, **James C. Kelly**

Hi Brian,

The object is a Peg Bar used by surveyors, The pointy end makes the hole and the other end is used to thump the peg in.

Have used one many times surveying power lines for the DEPB.

Cheers, **Dave Barrett**

The answer to your "What is this" question — the tool is a surveyors peg bar. The pointed end is used to punch a hole in the ground and the head end used to bang in the wooden pegs.

Grant Nicklin

Retired Land Surveyor

In reference to Brian Bell and the metal he found under a house it looks to me to be a peg for trying a rope to hold up a marquee or a large tent, the dimensions are the same as some I used when I worked in England some years ago. The local name for these was knitting needles. Many thanks for the interesting articles in The Shed. My daughter has a subscription and it is sent to my home here in France.

Regards, **Ian Godden**

Regarding the object Brian Bell found under an old house. I think it might be part of a geotechnical engineers tool kit for measuring ground load bearing properties, like a penetrometer it would be driven into the ground with a mallet to measure the resistance.

Regards, **Erik Scheltema**

It is a Surveyors Peg Bar — pointed end starts a hole at a measured point. The Survey peg is inserted and driven by the flattened end. I have one that belonged to my grandfather who, according to his diaries dated 1895 or thereabouts, "spent six months in the King Country bush cutting out native lands." No doubt his chainman carried the peg bar.

Great magazine! Many thanks.

Regards, **David Haszard**

My guess would be that it is a fid for splicing small diameter wire rope. I used to do a lot of that when I worked in the ski fields in the seventies. We would use a worn out round file, temper it, draw file it, and shape a point very similar to what is shown. Then weld a nut on the other end and grind it smooth for the handle. I still have a couple. This one is very long at over a metre though, but maybe it was used for tucking the strands on larger diameter rope.

Warren Johnston

Blenheim

I believe this to be a tool used in the splicing of wire rope.

Regards, **John Baynes**

PS. Thank you for the great magazine it was given to me for my birthday (a 12-month subscription).

These are used to make the holes for the spikes of hazel hurdles, and to carry several hurdles over your shoulder. In modern times they can be used for lining up bolt holes on structures.

Steve Boleyn

*Letters should be emailed to
editor@theshedmag.co.nz, or posted
to Editor, The Shed, PO Box 46,020,
Herne Bay, Auckland 1147.*

PAINTING TIPS FROM THE RESENE EXPERTS

When it comes to painting, there are some easy ways you can save time to get your quality paint-finish faster. So, to help you get your paint job done right the first time every time, we've asked the Resene experts to share some of their top tips ...

Tap don't wipe

When you're painting with a brush, dip the bristles around one-third of the way into the paint, then tap, don't wipe, the brush on the side of the can. Tapping the brush will help stop your paint dripping as you move the brush to the wall. Wiping the brush means you'll end up with a lot of paint back in the can and less on your walls.

Be a smooth finisher

When you're brushing around window sills, trim and fretwork, it can be harder to get a smooth finish. Add Resene Brushing Additive to your Resene Lustacryl or Resene Enamacryl waterborne enamel for extra smoothness. Remember, let the paint flow naturally off the brush. Avoid overworking the paint or you'll end up with more brush marks.

Save washing up

Washing brushes and rollers can waste a lot of time and water. Instead, wrap your brush or roller in plastic cling wrap or a tightly sealed plastic bag while you take breaks or overnight. Then you can come straight back to painting when you're ready to start again.

Mark your containers

Each time you finish painting, mark the level of the paint on the outside of the can, which room you have used the paint in, and when. That way, when you need to repaint later you can quickly see which paint you last used and whether you'll have enough to get the job done.

Did you know? If you need help with your painting or wallpaper project Resene has free expert advice available — simply use the free Ask a Tech Expert service online, resene.co.nz/techexpert, visit your local Resene ColorShop or call 0800 RESENE (737 363).



the paint the professionals use

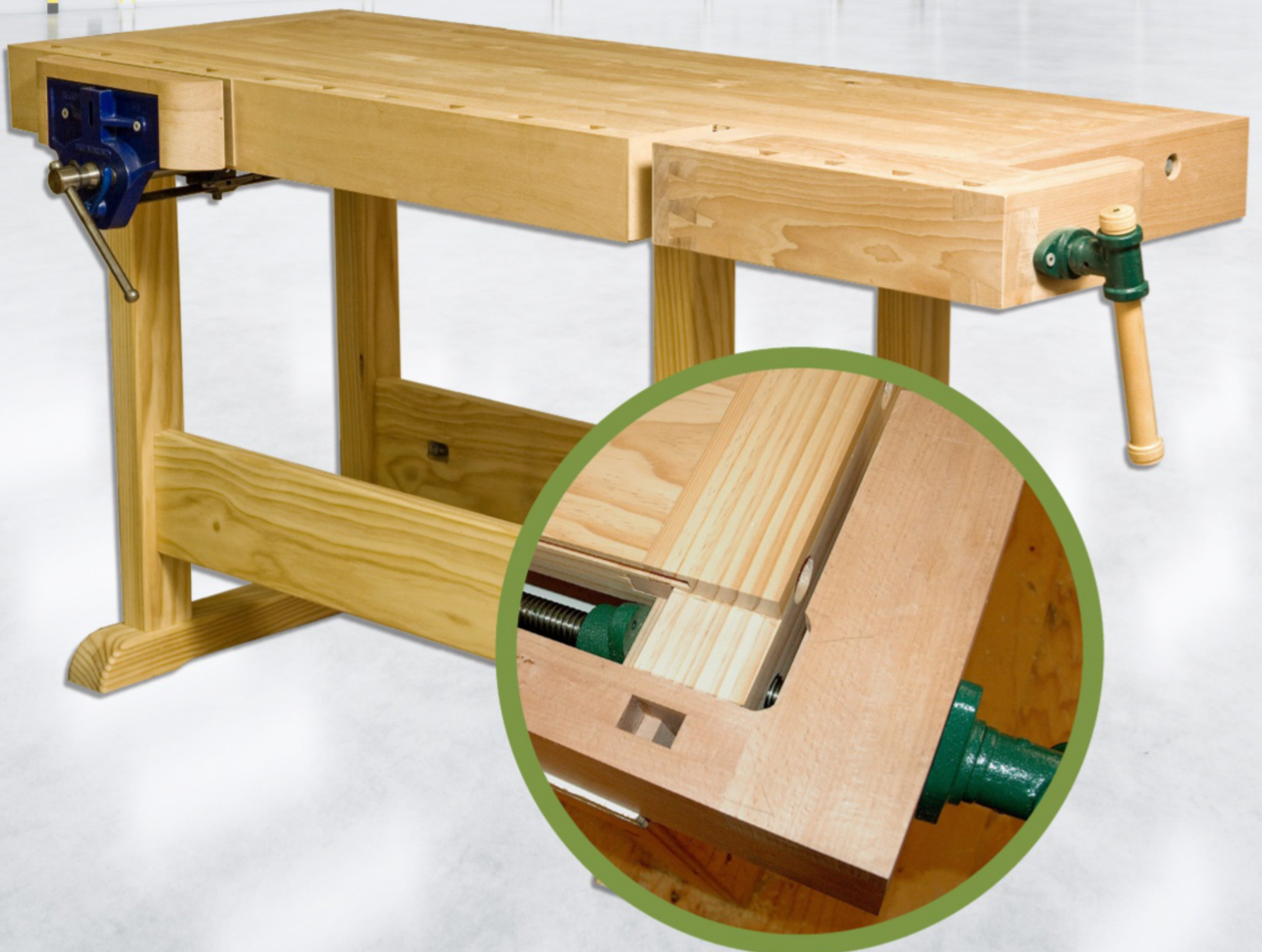
MAKE A CLASSIC WORK BENCH: THE TAIL VICE

PART 2

The second and final part of building a classic cabinetmaker's bench.

By John Shaw

Photographs: Daniel Allen, John Shaw

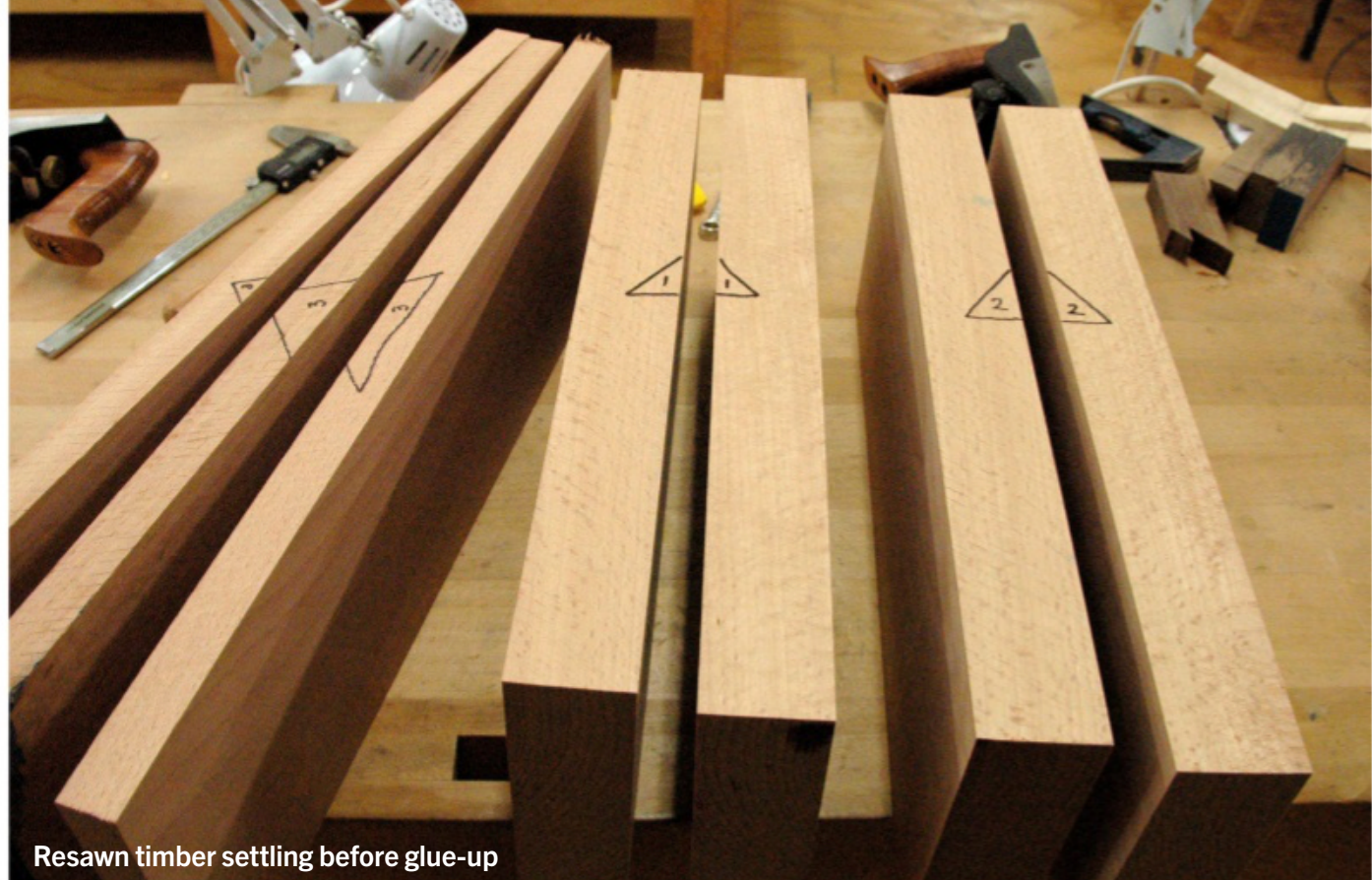


Right, so now that you're back from your warm, sunny Pacific Island holiday — taken to recover from making the benchtop and frame (*The Shed* May/June, Issue 103) — it's time to get working on the vice. What we have on our hands is a beautiful little project of reasonable complexity that demands accuracy, uses both hand and machine skills, and is incredibly satisfying in both the making and the using.

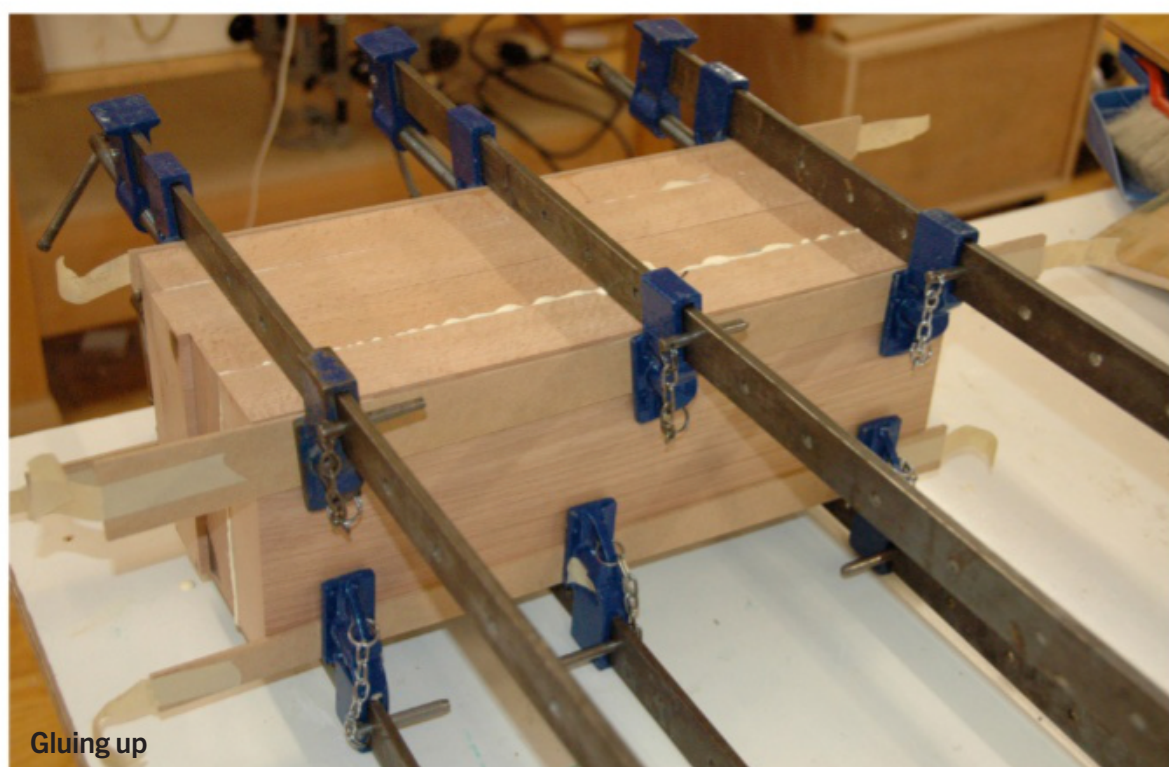
Accurate

The concept behind the vice is a parallel box made up of four components that is driven along a series of guides and matching tongues and grooves by a single screw. In order for the vice to function effectively, all stages of the construction must accurately keep the unit square and parallel. Familiarise yourself with the drawings in order to get a good understanding of how the parts will fit together.

To begin the process we need to prepare the benchtop; this means ensuring that all the parts of the benchtop are fitting together properly and the face — which is to become the vice jaw — is square. The bench end at the tail-vice end of the benchtop becomes

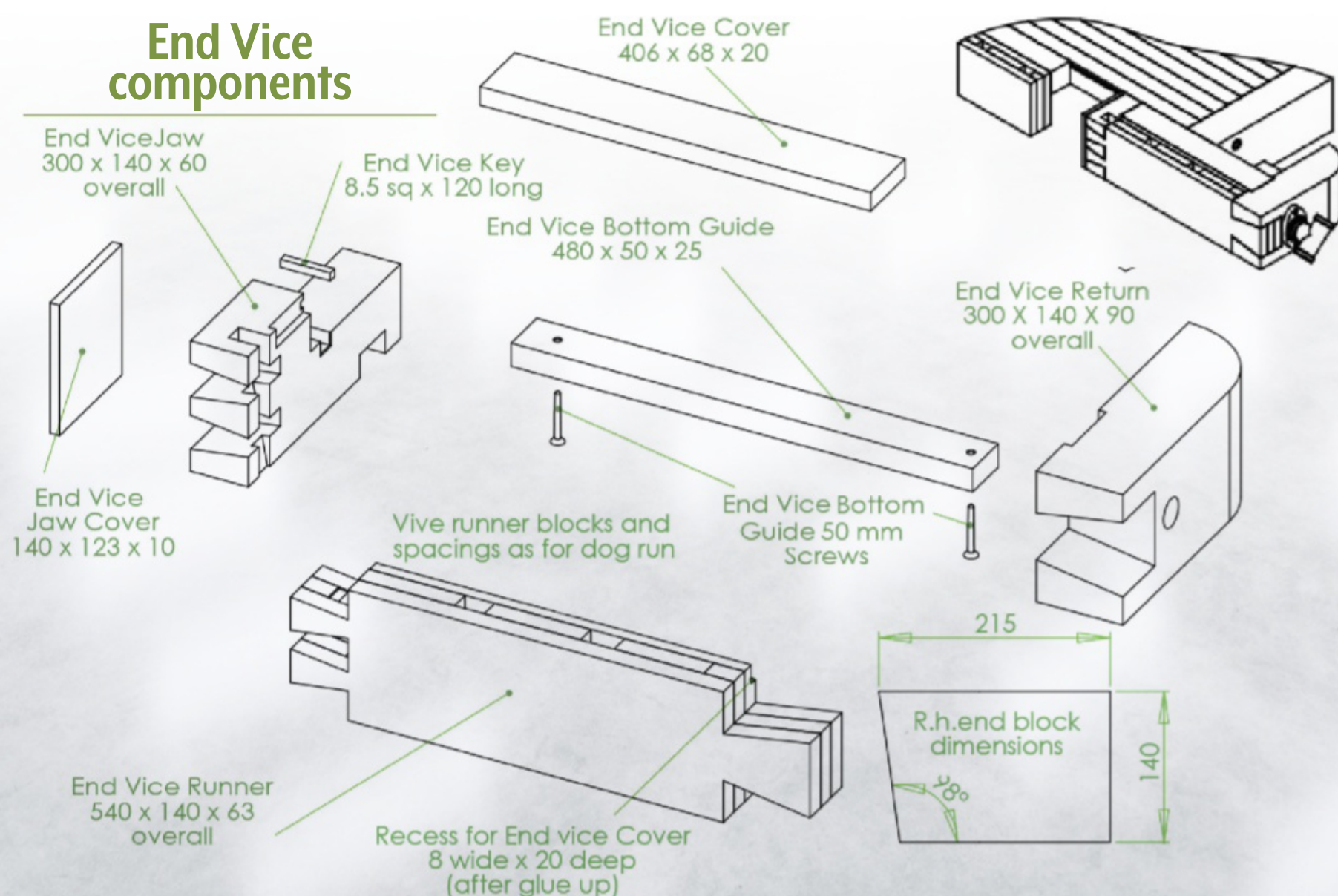


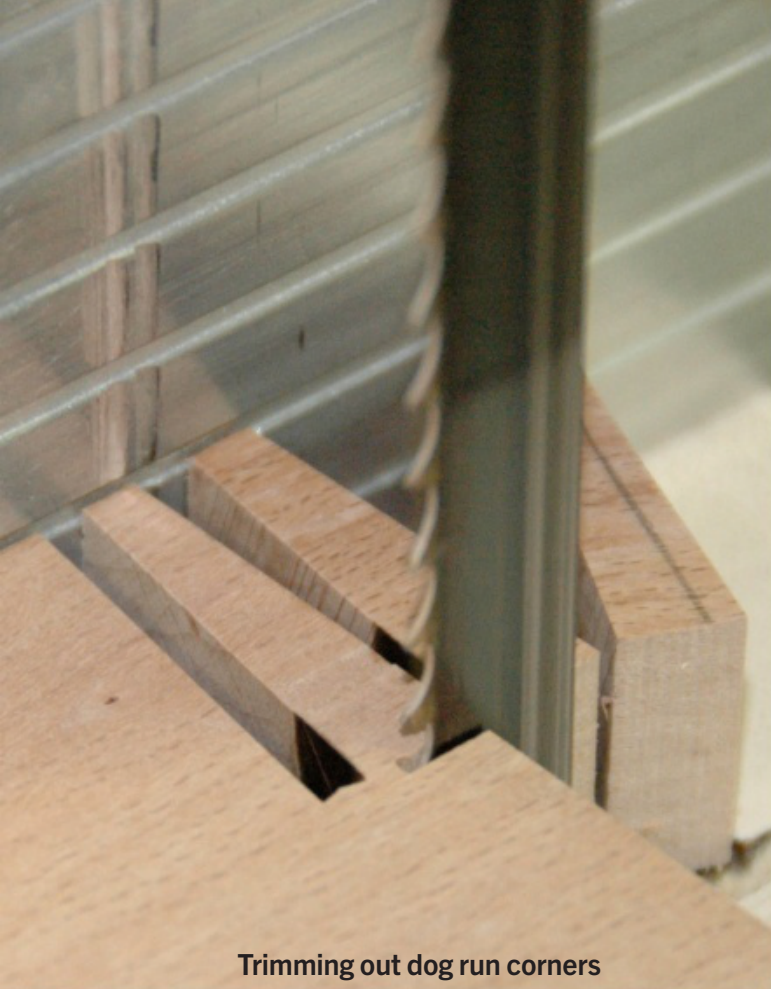
Resawn timber settling before glue-up



Gluing up

End Vice components





Trimming out dog run corners



Dog run layout

an integral part of the mechanism. This must be made flush with the benchtop before we make any modifications to it.

Three of the four components are of such size that they will be glued up from several pieces. These pieces should be sawn reasonably oversize, ideally allowed to settle overnight, then re-machined to slightly oversize, glued up into the large blocks, allowed to settle again, then carefully machined to final dimension size. Note: the outside face of the vice is made in the same way that the dog run is made

“All stages of the construction must accurately keep the unit square and parallel.”

on the benchtop (reversal of angle). Check the drawings for dimensions and lay out the elements carefully. The aim is to have the three pieces in final dimensions cut to length and square, ready to mark out the dovetail corner joints.

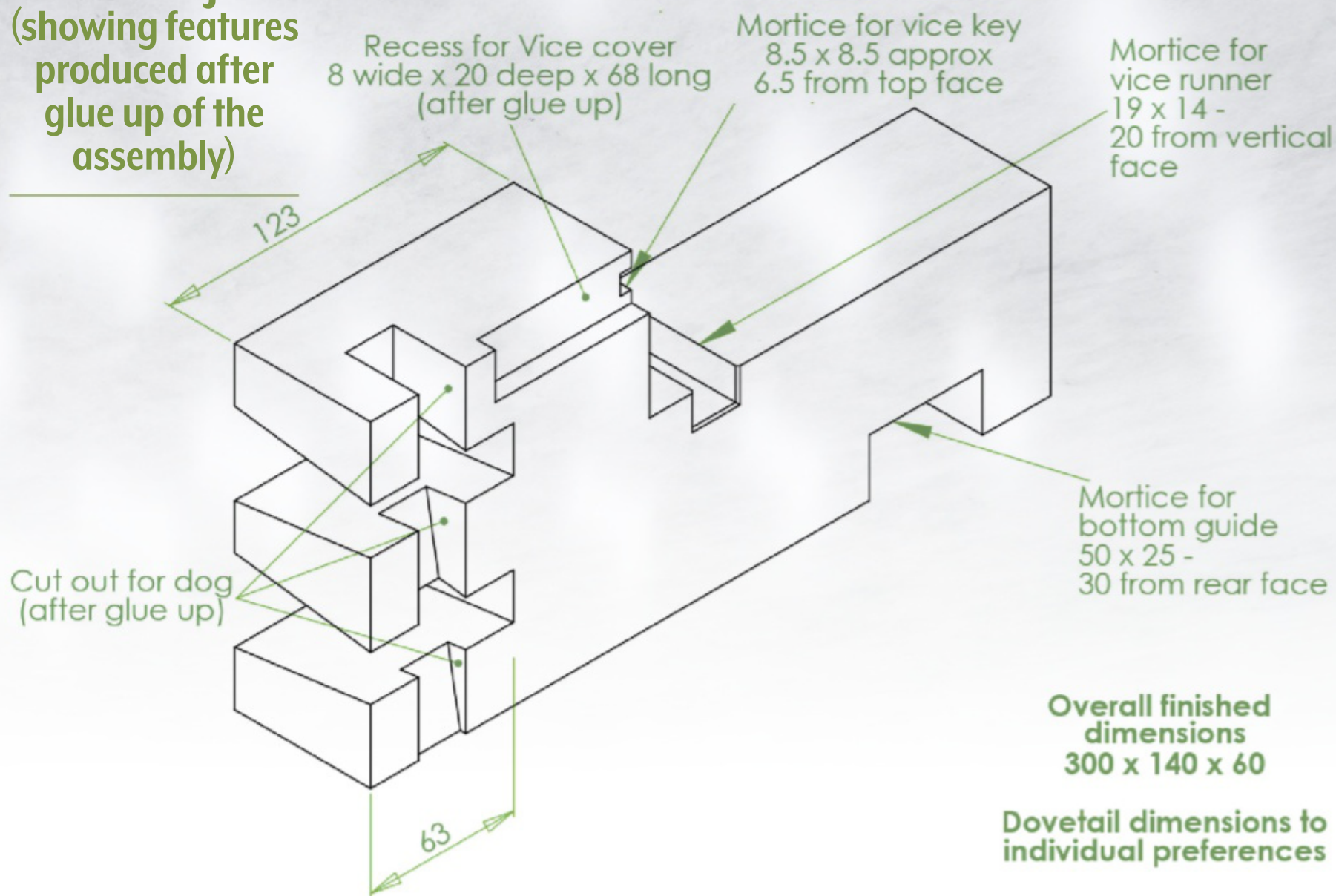
Dovetails start

We start the construction by marking out the dovetails onto the vice front. This process of dovetailing is like any other. We start with the tails, cut them out to size, then mark these on to the

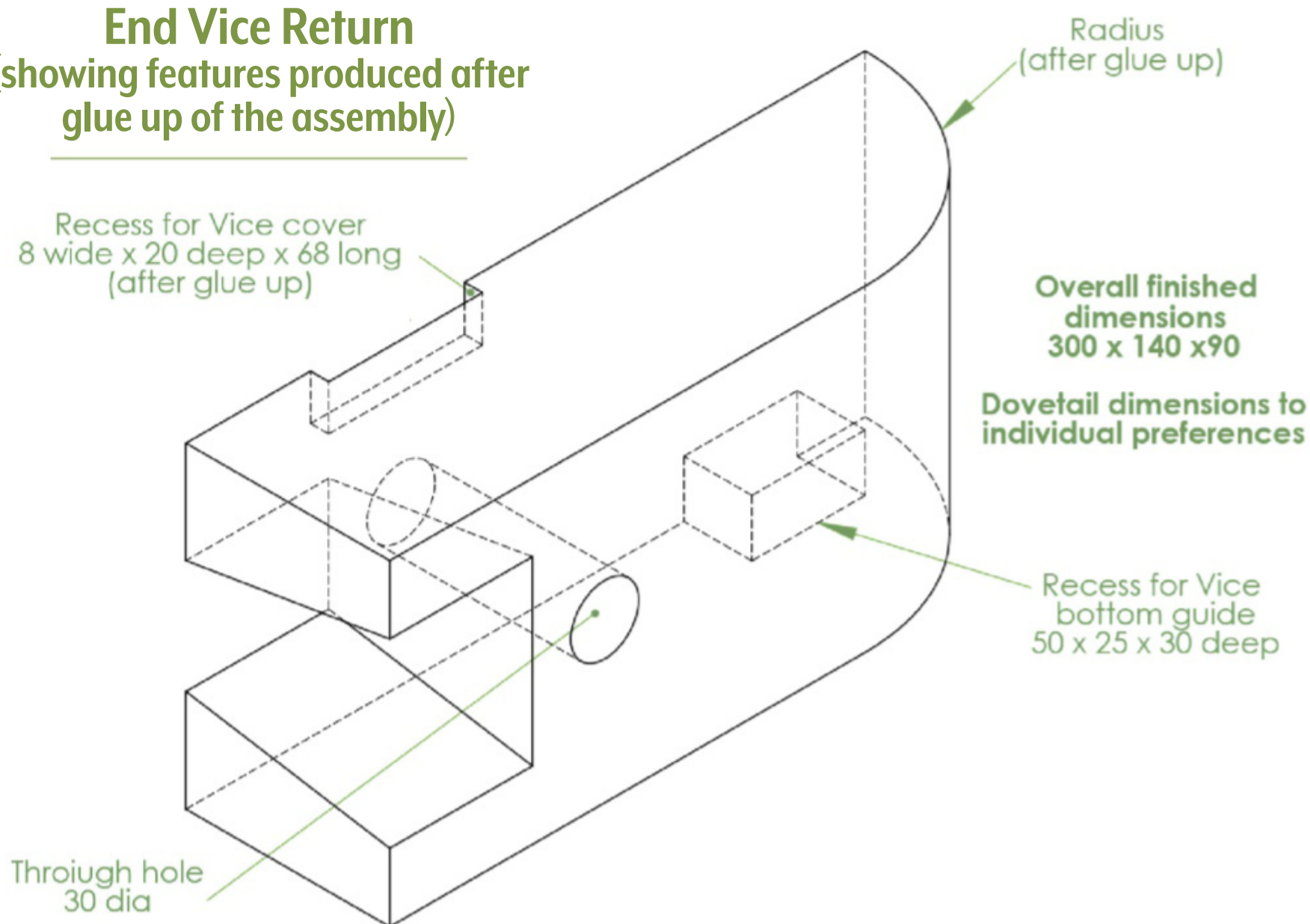


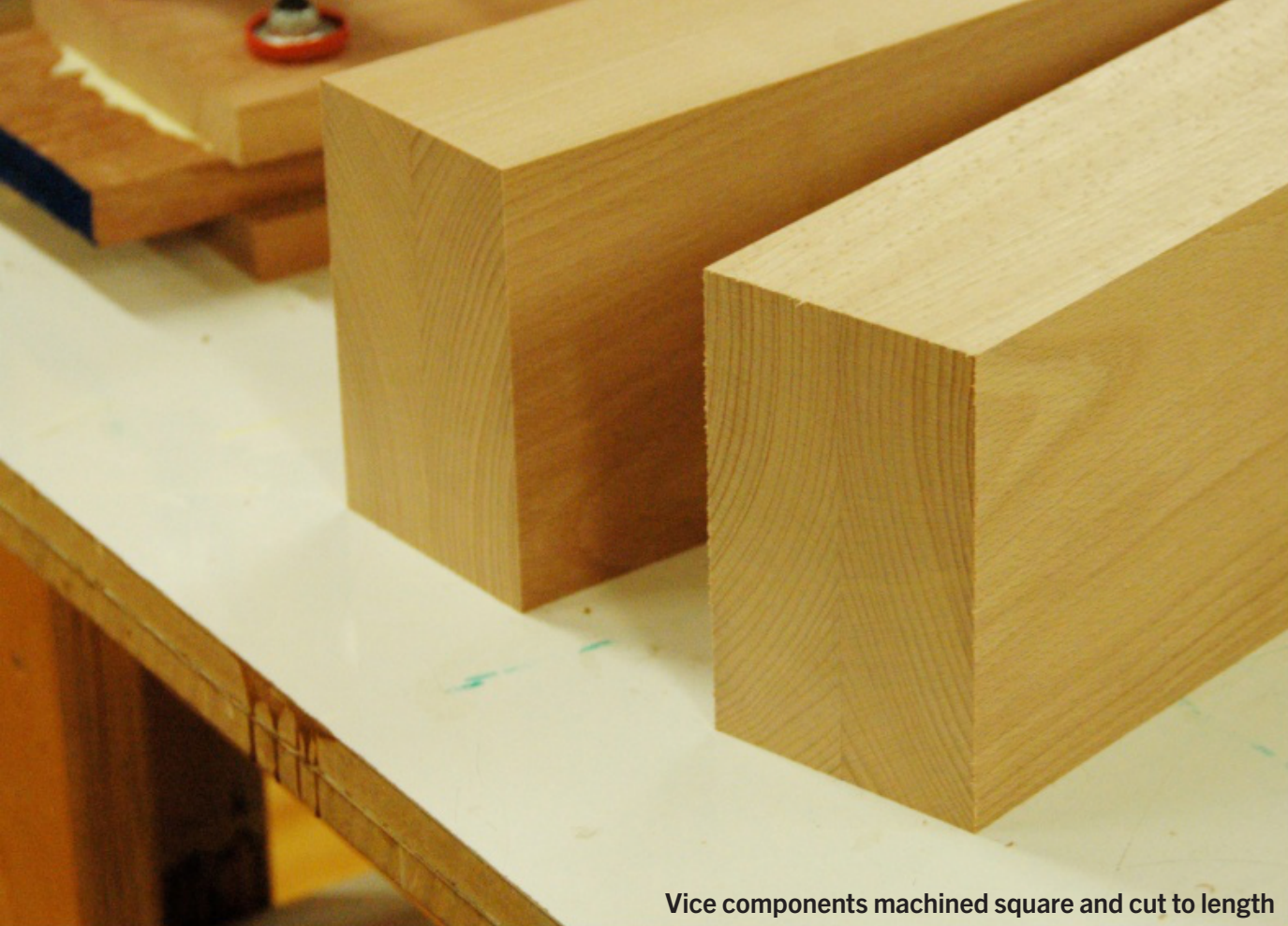
Dog run glue-up

End Vice Jaw (showing features produced after glue up of the assembly)



End Vice Return (showing features produced after glue up of the assembly)





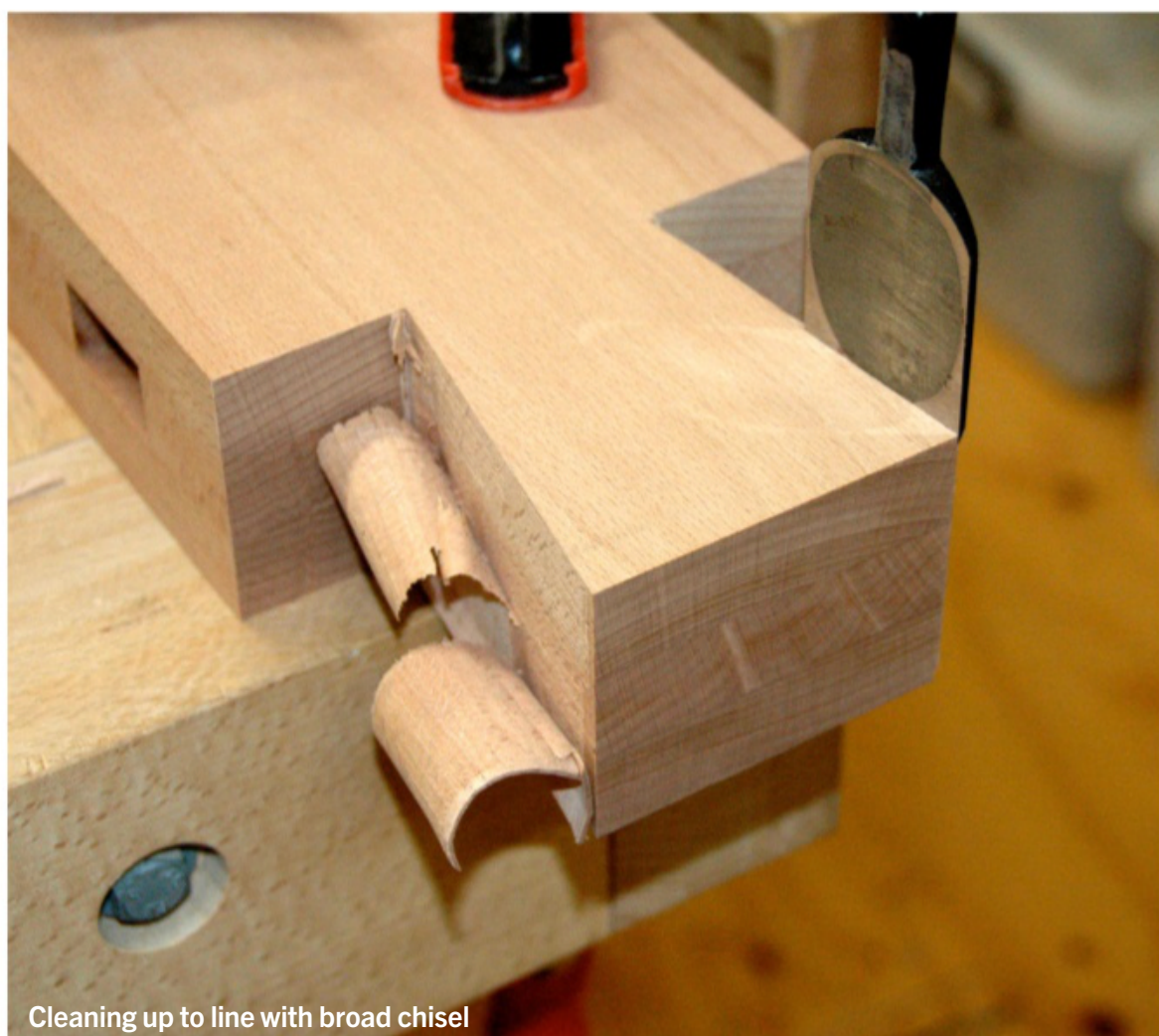
Vice components machined square and cut to length



Using circular saw to cut shoulders of dovetails



Bandsawing waste just outside the line

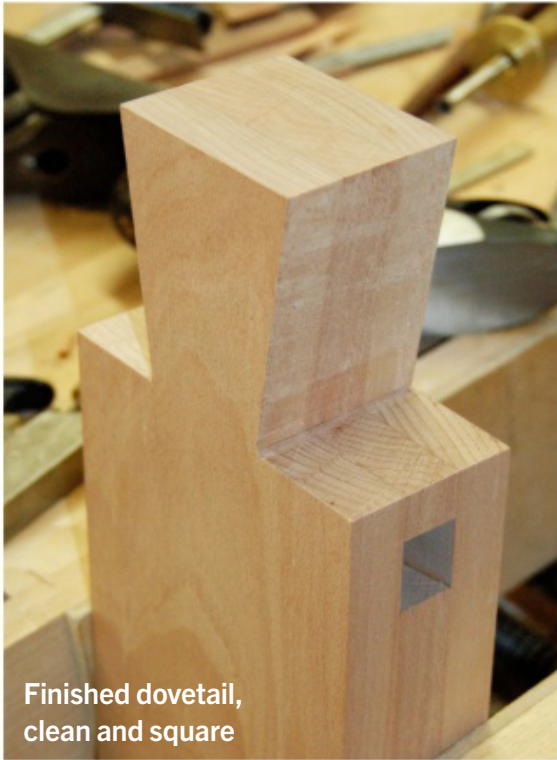


Cleaning up to line with broad chisel

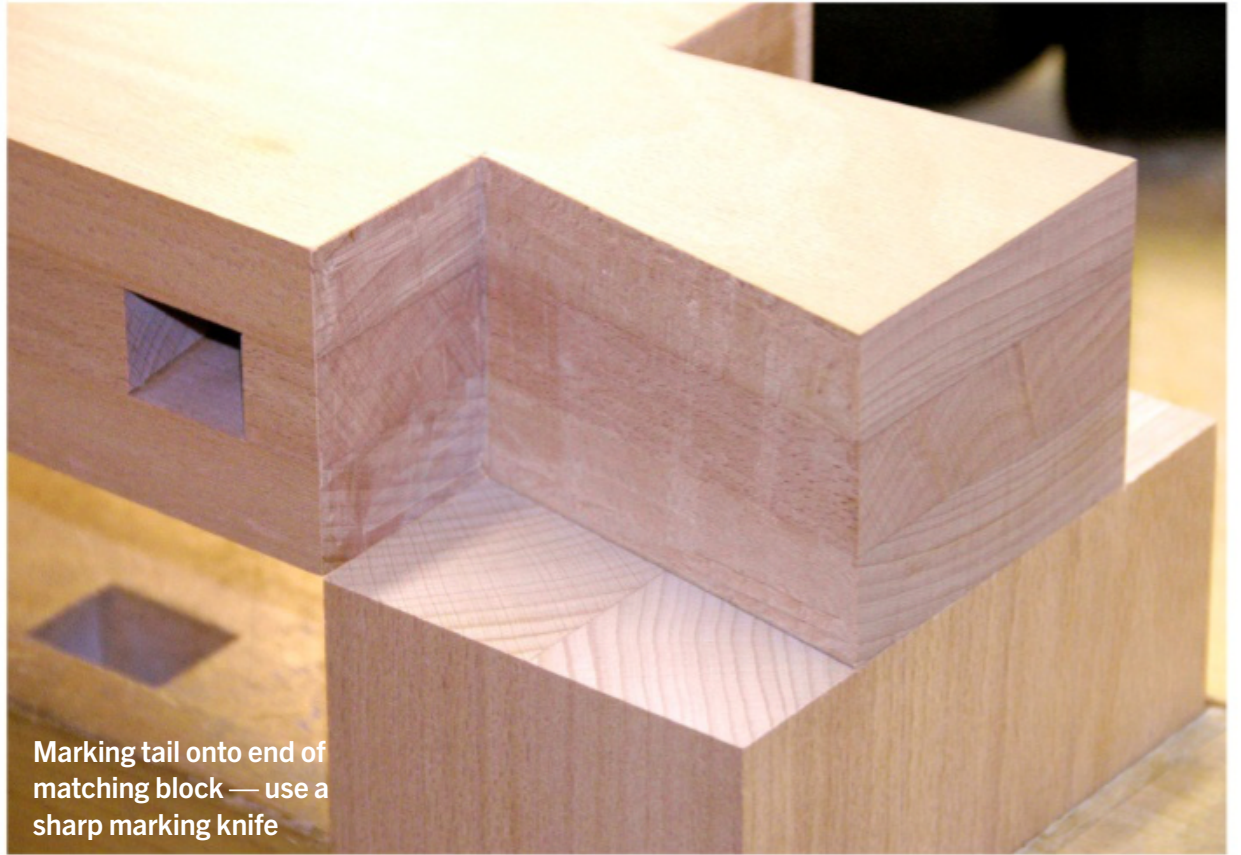
mating parts, set those out, remove the waste, and fit the elements together. Because of the scale of these dovetails, I chose to remove most of the waste with a bandsaw and circular saw, then used chisels to clean up to the knife line. These are possibly the biggest dovetails you will ever make — have fun. Once these three components fit well together, check again for square using diagonal measurements.

Now we must fit one of the first slides; this goes into the bottom underside of the vice ends. Two rebates are routed through the components using a carefully made jig to ensure accurate location. A cutter with a parallel bearing on the shank is perfect for this job — although it'll be easier if yours ▶

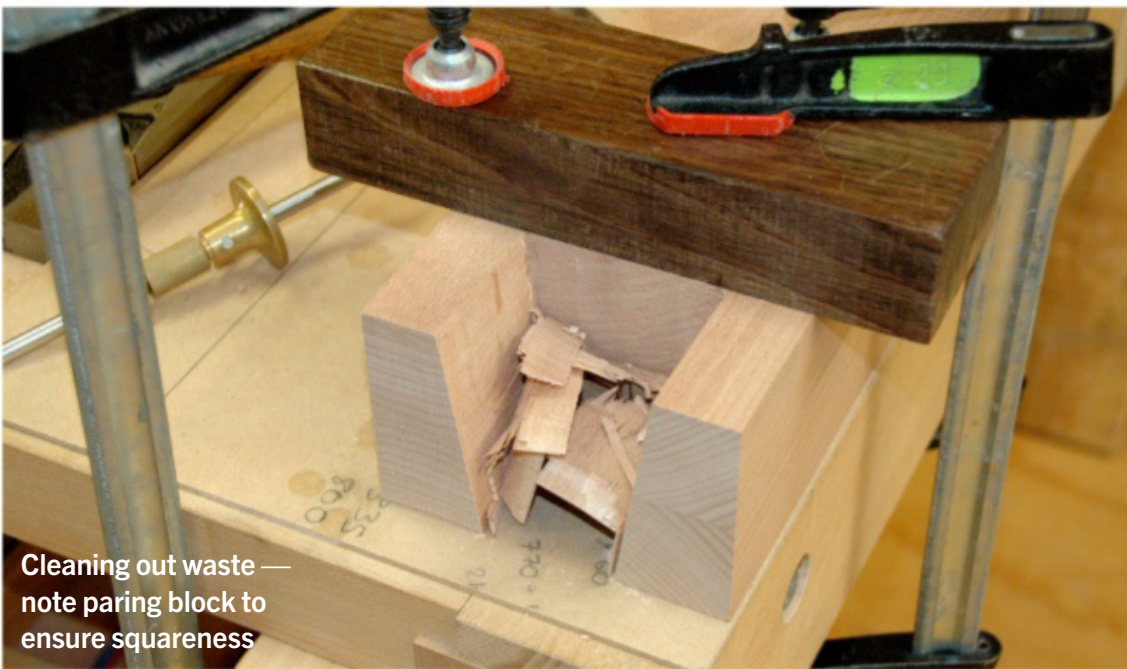
“Two rebates are routed through the components using a carefully made jig to ensure accurate location. A cutter with a parallel bearing on the shank is perfect for this job.”



Finished dovetail,
clean and square

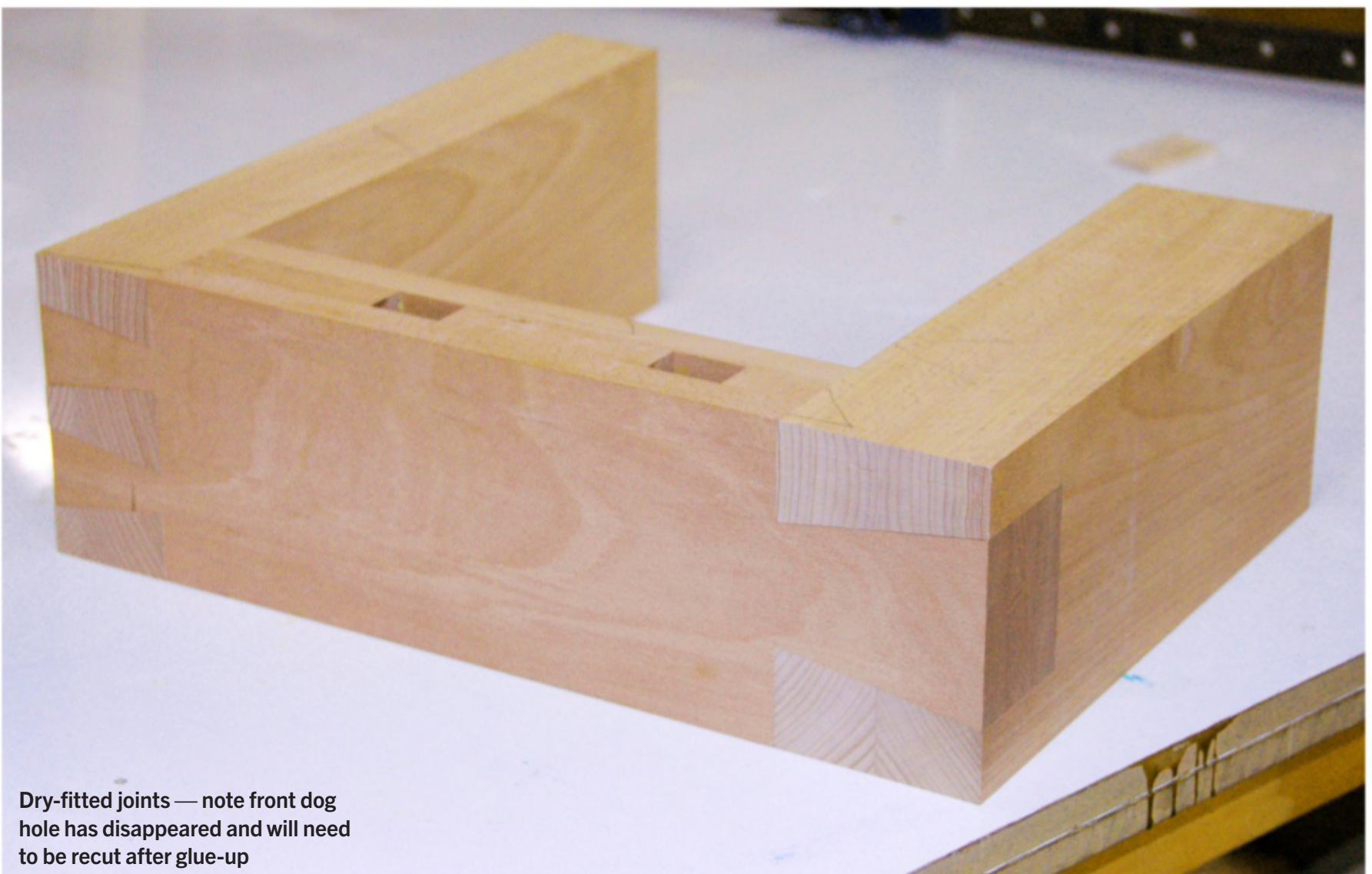


Marking tail onto end of
matching block — use a
sharp marking knife



Cleaning out waste —
note paring block to
ensure squareness

“Because of the scale
of these dovetails,
I chose to remove
most of the waste
with a bandsaw and
circular saw, then
used chisels to clean
up to the knife line.”



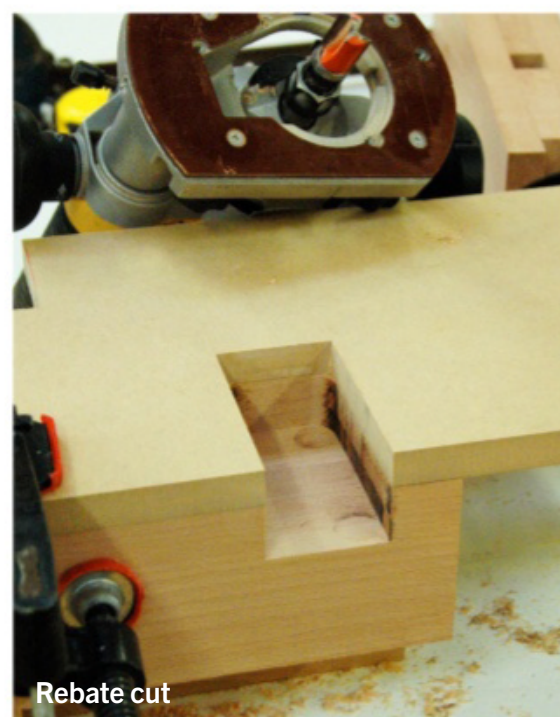
Dry-fitted joints — note front dog
hole has disappeared and will need
to be recut after glue-up



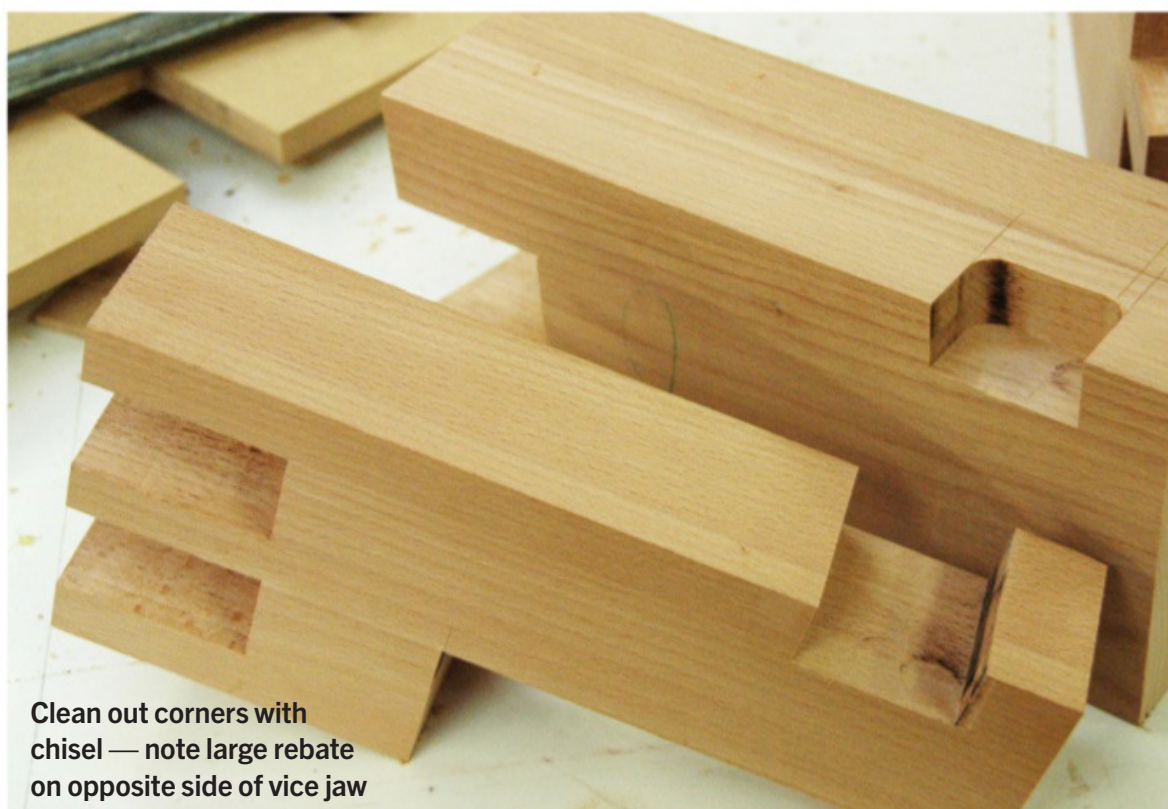
Marking out rebate with both parts clamped together



Template in place — note bearing on shank of router bit



Rebate cut



Clean out corners with chisel — note large rebate on opposite side of vice jaw

“The size of this rebate is defined by the existing thickness of your benchtop.”

is sharper than mine. Note how both parts are clamped together to ensure that the rebates finish up parallel to the outside face. Machine a matching piece of extremely hard wood for this slide — it should fit tightly and flush, but not so tightly that you have to force it home.

Large rebate

We now need to cut a large rebate into the component that becomes the vice jaw. The size of this rebate is defined by the existing thickness of your benchtop and the depth from the outside of your dog run to the first element of the bench. The top edge of this rebate will slide along the underside of the bench. We must then cut a second small rebate across this newly created face — note how this is achieved in the photographs. This will provide us with a running groove for one of the guides. A matching groove in the bottom of the bench will ►

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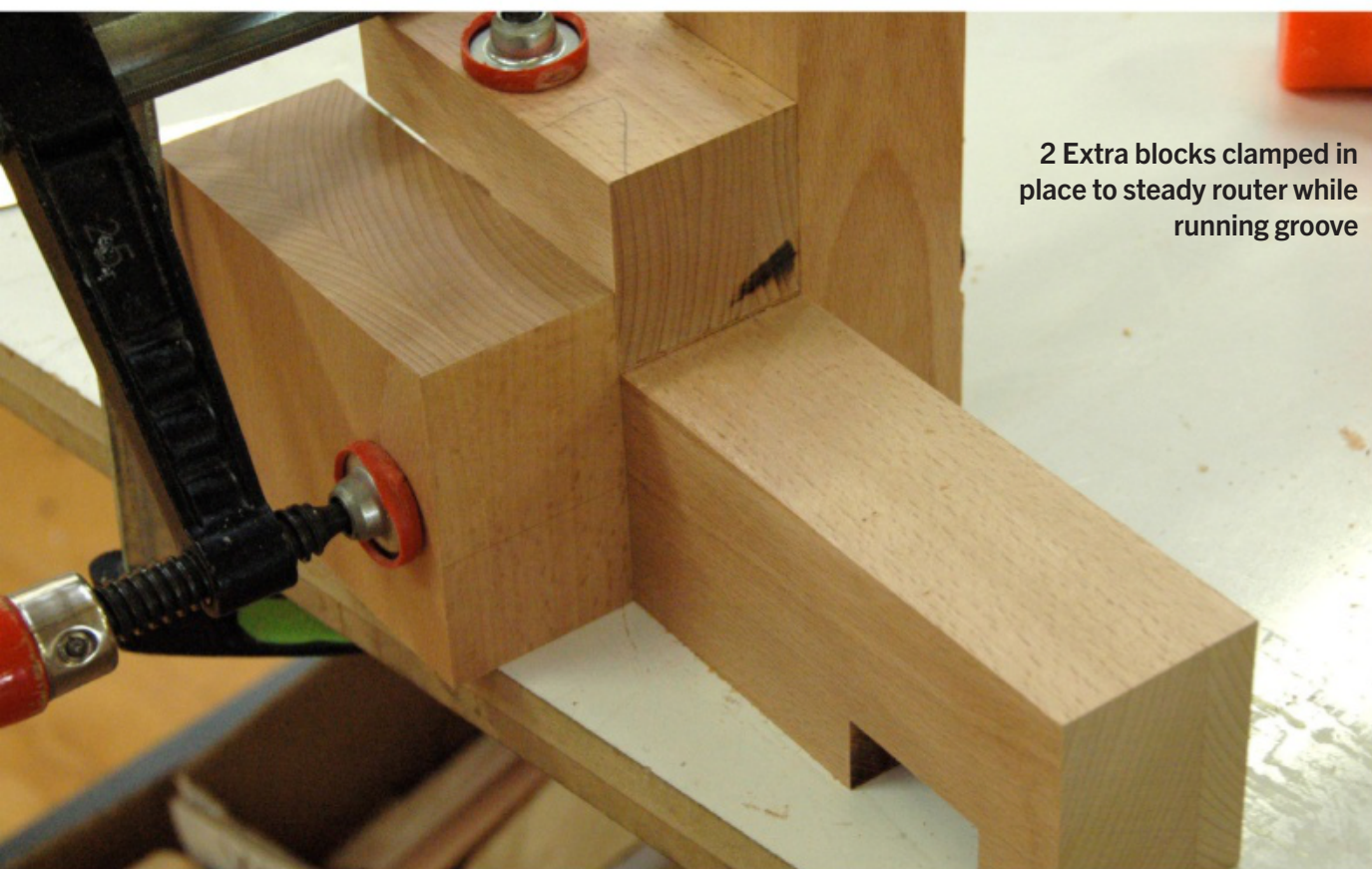
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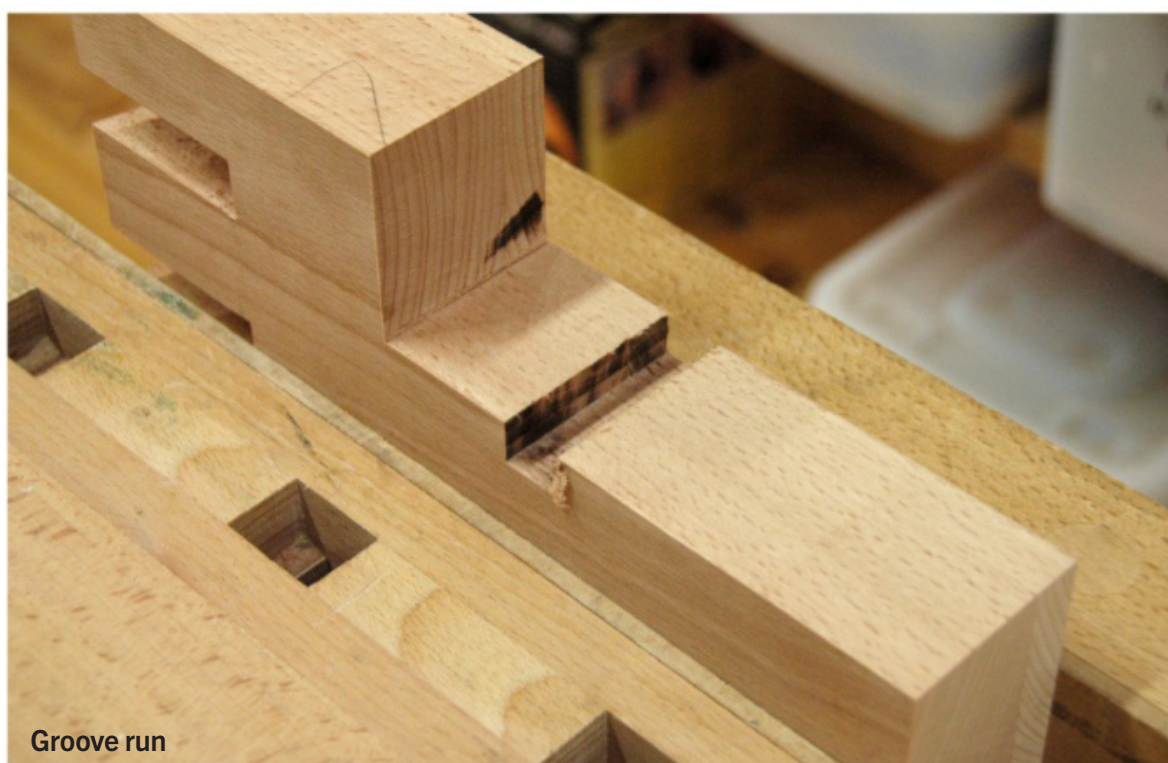
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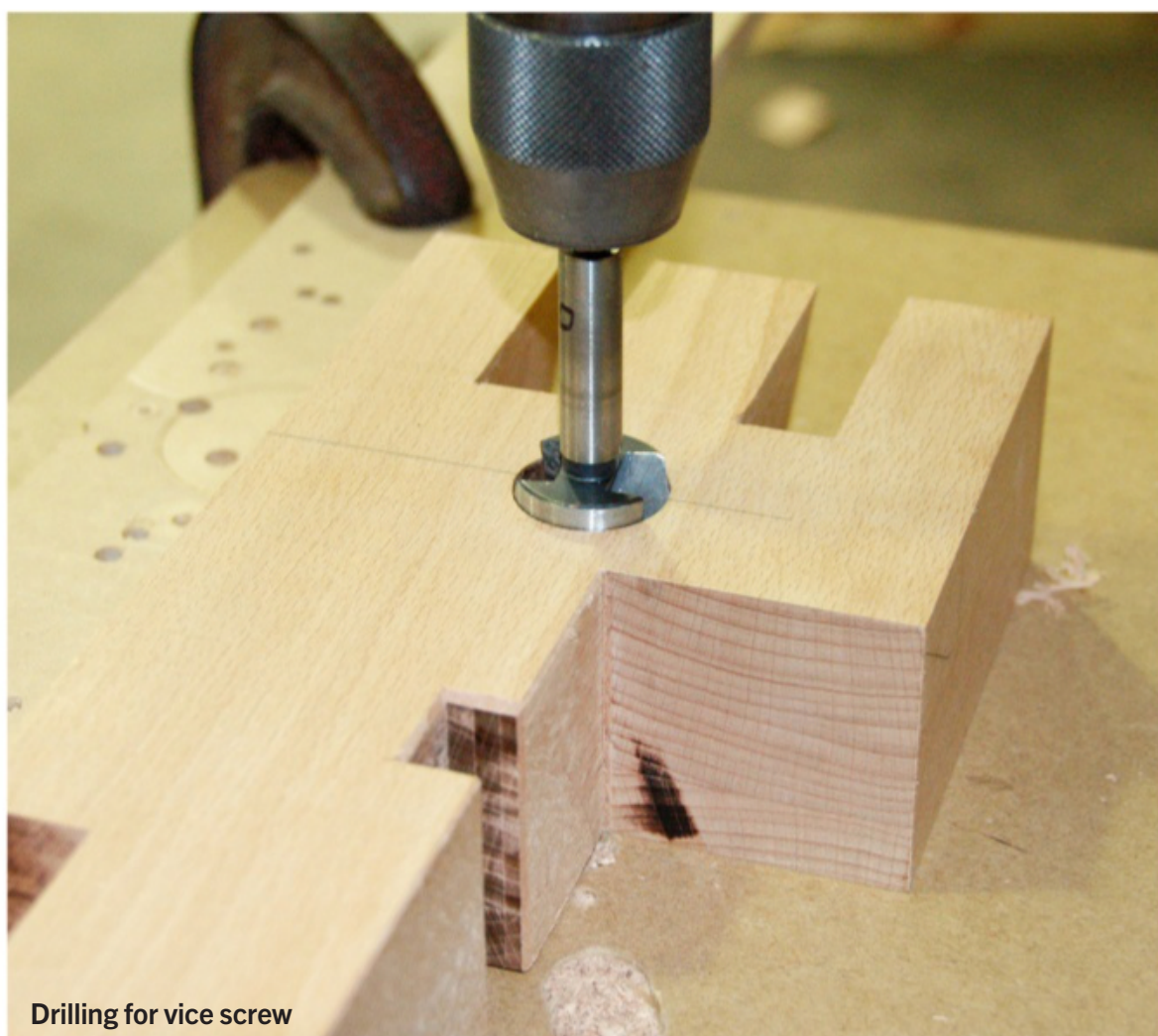


2 Extra blocks clamped in place to steady router while running groove

“Do a final dry clamp to figure out the most effective location of the clamps and ensure that everything goes home square and parallel.”



Groove run



Drilling for vice screw

provide a location for the guide itself. The guide should again be a hard wood. Note the slight angle at one end to allow it to be slipped into place when finally assembling the vice and benchtop.

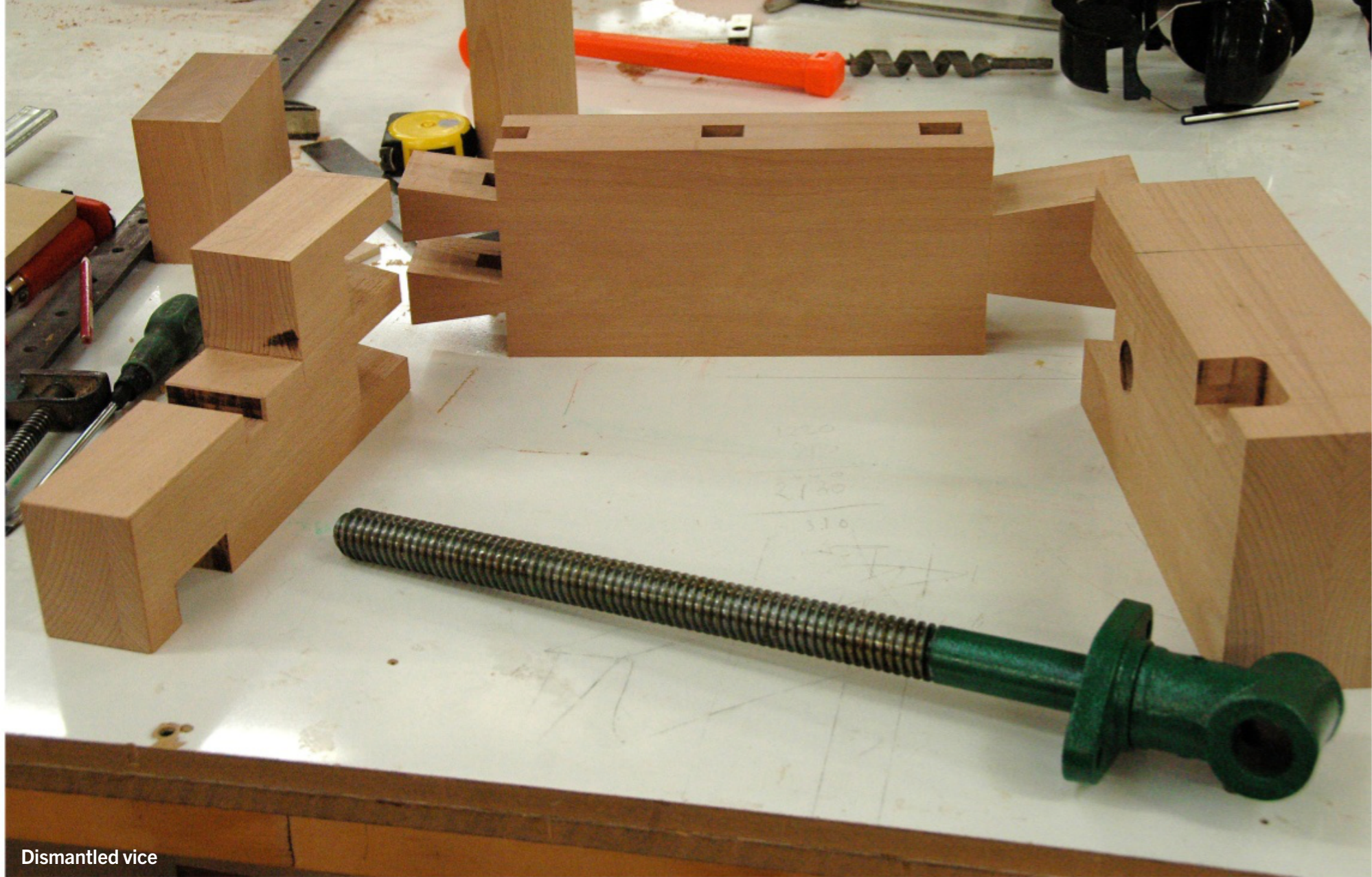
The final remaining element of the vice itself is the top plate. A rebate approx. 20mm deep is required for this to drop into; this is made using a rebate cutter in several cuts. Note the stops clamped into place to ensure the cutter can only cut where we want it to.

Bench end

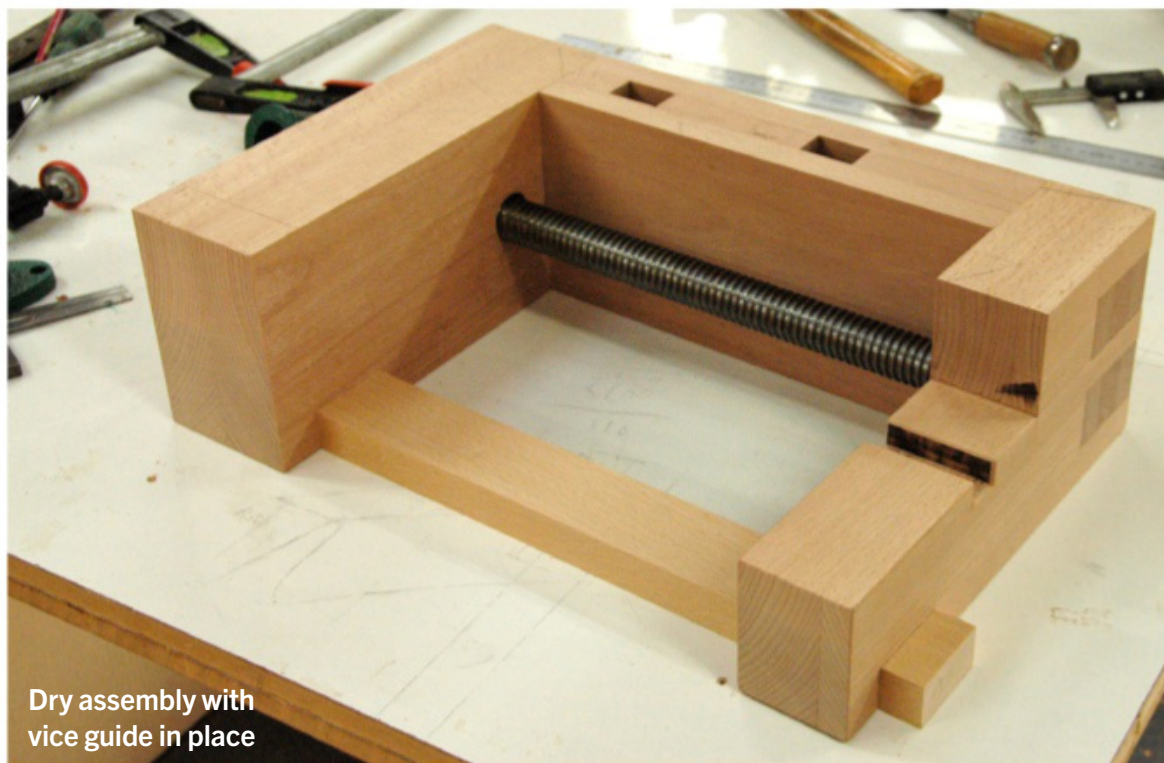
Now it's time to sort out the bench end, cutting this to length so that it extends beyond the bench itself as far as required to touch the inside face of the vice front. We then cut a rebate out of the top of this bench end equivalent to the thickness of the top plate. You can see that when the top plate is fixed in place the underside will slide over the top of the new rebate.

Now drill holes for the screw. The one through the vice should be 2–3 mm greater in diameter than the screw itself. Check the length of your screw against the dry-assembled vice and drill into the back of the vice jaw if necessary to allow the screw to go right home. Put the vice in place on the bench and match the screw hole in the vice to the bench end. Drill through the bench end, making the same diameter hole.

It's now glue-up time. First do a final dry clamp to figure out the most effective location of the clamps and ensure that everything goes home square and parallel. Then put it all together with glue and clean up. ▶



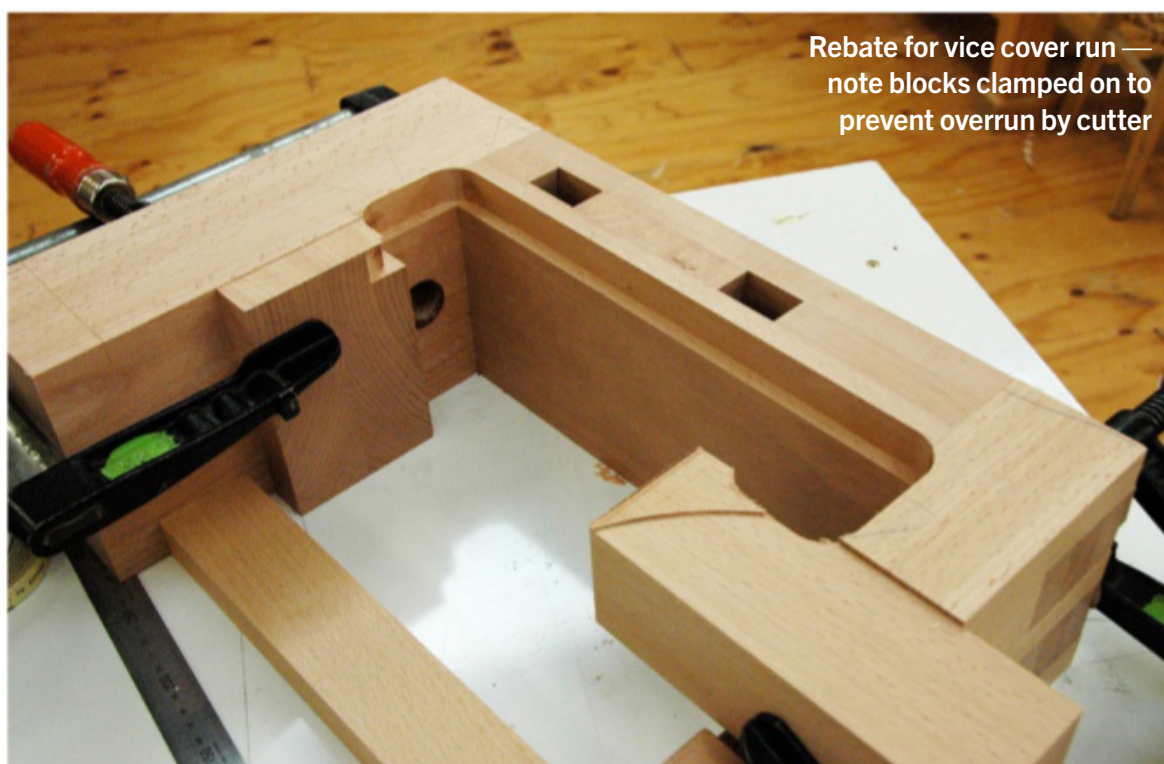
Dismantled vice



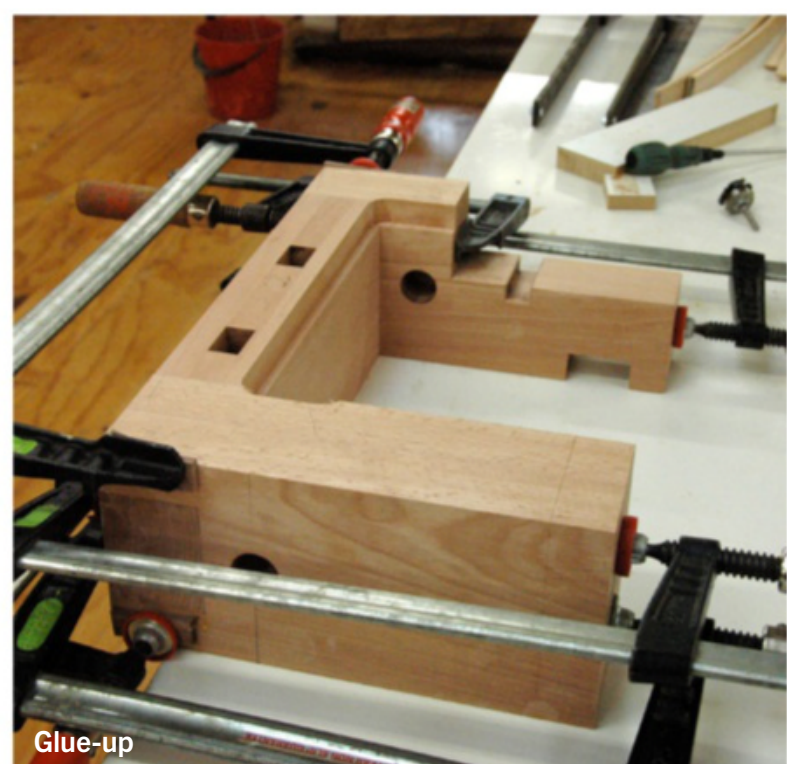
Dry assembly with
vice guide in place



Setting height of bearing
guided rebate cutter using
Vernier height gauge

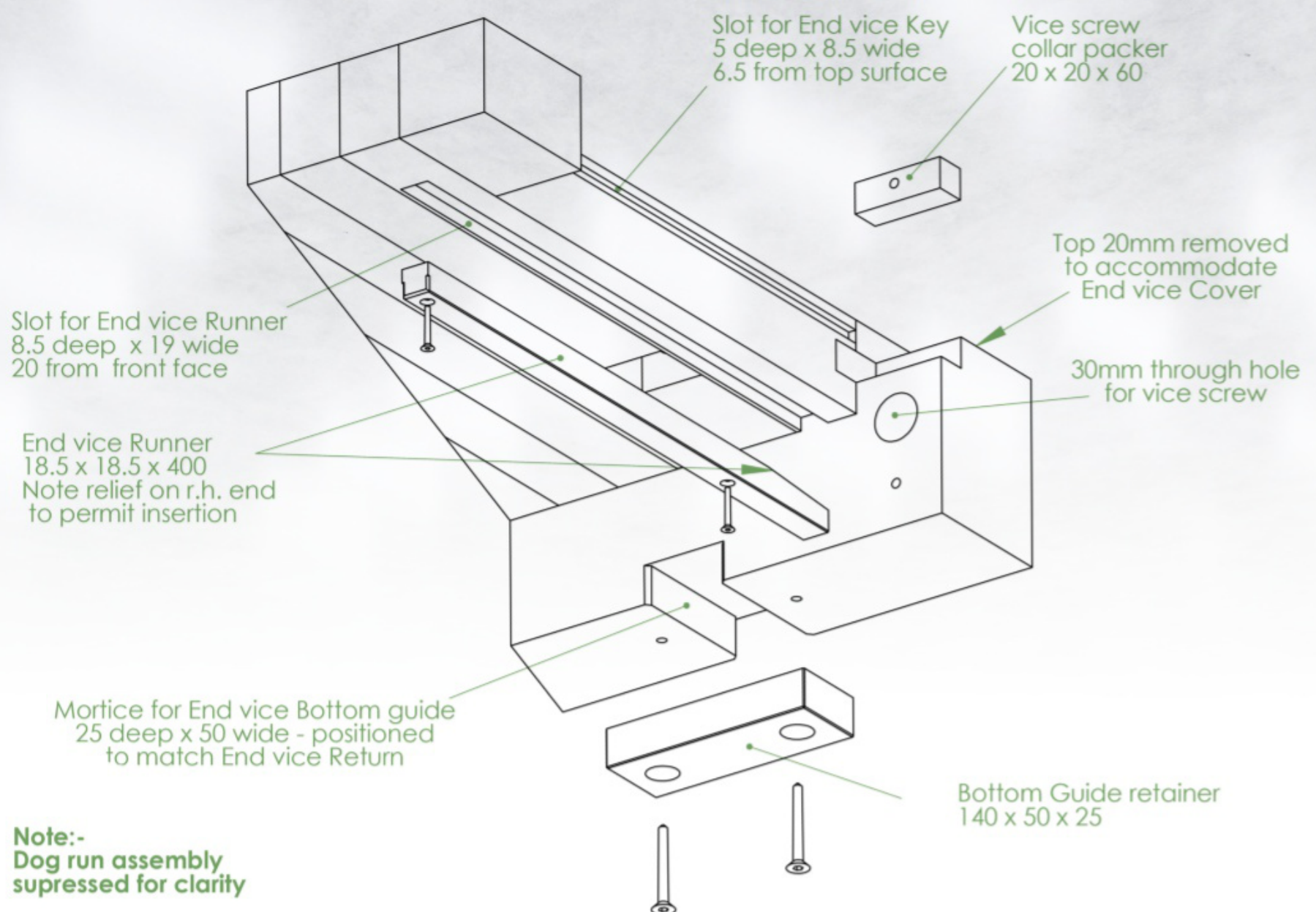


Rebate for vice cover run —
note blocks clamped on to
prevent overrun by cutter



Glue-up

Bench Top modifications and components for End Vice installation



Groove

A groove in the edge of the bench is run next. This matches a groove we run in the vice into which we put a hardwood tongue. The tongue will eventually be glued in place and it will slide backwards and forwards along the matching groove in the bench edge. Using a slot cutter in a router and cutting both grooves on the same router setting will ensure they match. Once again, check drawings for accurate locations.

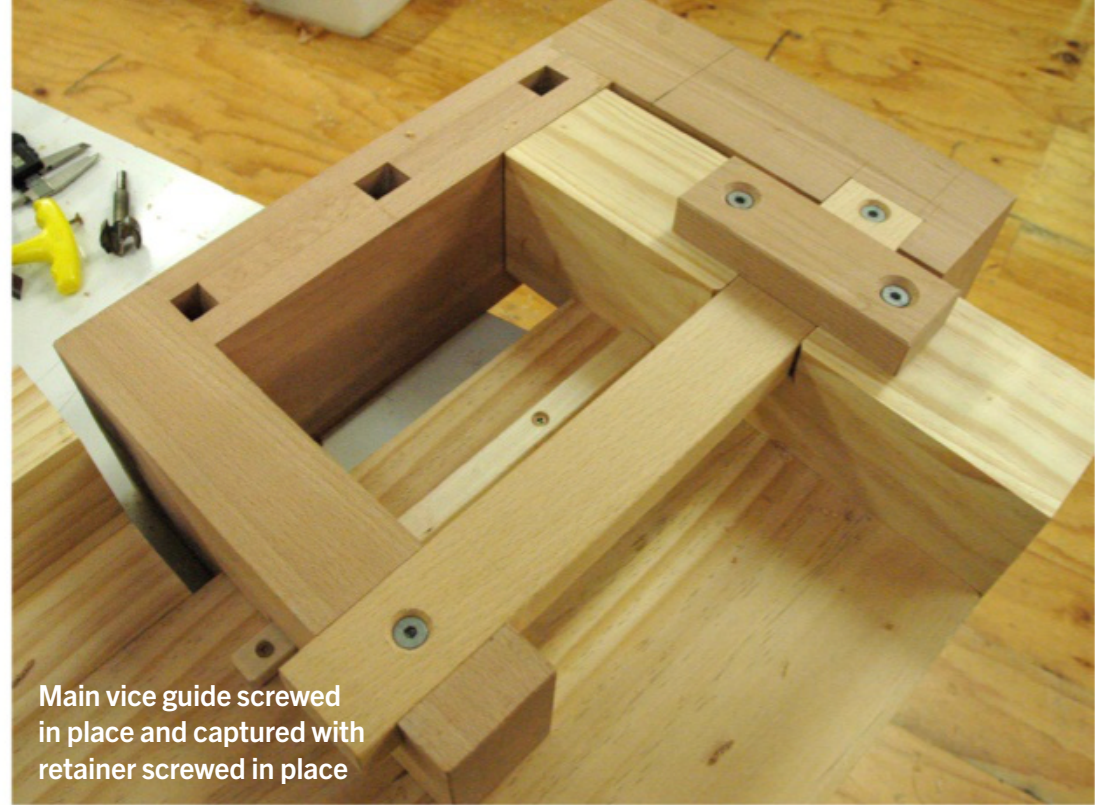
We can now place the vice into its location. The last thing we need to do is match the grooves in the undersides of the vice face and back with a new slot cut into the underside of the bench end.

Use the original template we made earlier to ensure all three rebates are the same dimension and in perfect alignment. Our major vice slide will travel backwards and forwards through this groove and will be captured by screwing a locating piece of wood over

the top. This slide can now be screwed in place. The nut for the vice screw should also be screwed in place inside the face of the bench end. Note: you will probably have to fit a small packer in place to allow the nut to fully seat.

The final slide should then be slipped into position underneath the bench. This should firmly lock the vice into place. Chop through the bench dog hole that was filled when the dovetails fitted together, clean up the vice, make a round





“If all has gone well, the vice should run with some friction but stay perfectly parallel as it withdraws.”

corner on the outside back edge, flush the surfaces off, insert the screw, fix the flange into place, and try winding the vice backwards and forwards.

Some friction

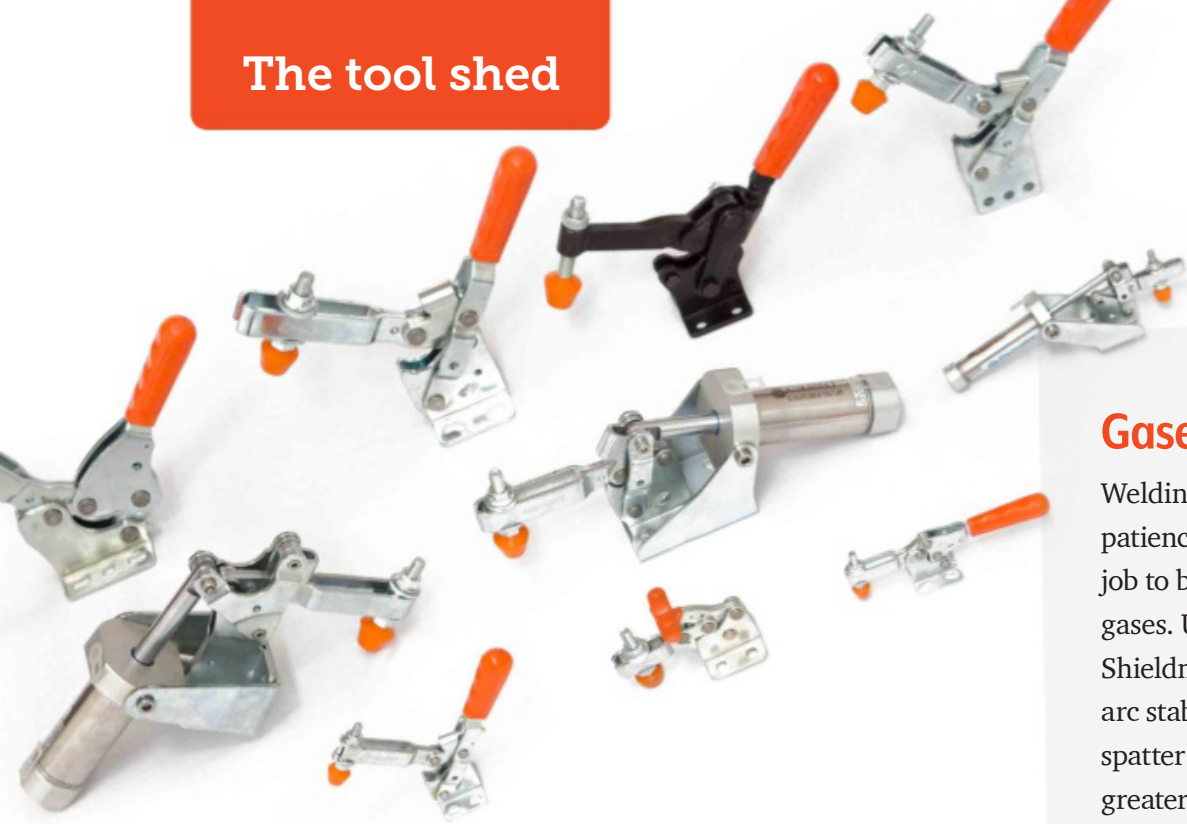
If all has gone well, the vice should run with some friction but stay perfectly parallel as it withdraws. Gluing a sacrificial face onto the jaw of the vice will protect your careful construction and allow you to true the vice jaws each time they become worn.

Your bench should now be looking superb. Allow yourself a few minutes to humbly walk the neighbourhood accepting the resultant praise and accolades. Then return and make a nice handle and the spring-loaded bench dogs that make it such a wonderfully flexible tool.

I hope you’ve enjoyed this project as much as I have. Special thanks to Ryo, Mia, Lachie, and everyone in The Centre for Fine Woodworking shop who tolerated my repeated disassembly of

their vices — usually at critical times — to try to remember how it was done. John Towse of T-Tech Ltd has been wonderful with his patient and skilful working up of the drawings, and Dan Allen of Daniel Allen Photography provided his usual fantastic level of support. Cheers.

It is worth noting that a kit made of three metal plates with matching grooves can be purchased to enable the fixing of a tail vice onto a cabinetmaking bench. We use these also at the centre but generally find that they still require a reasonable amount of fitting and tuning to ensure their effectiveness, and the construction of the vice itself is different — drawings for this type of vice are provided with the kit. 📄



Toggle Clamps

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THE DAVID REID TECHNIQUE OF LOST WAX BRONZE CASTING

Alchemist David Reid takes us further into the processes of this ancient craft

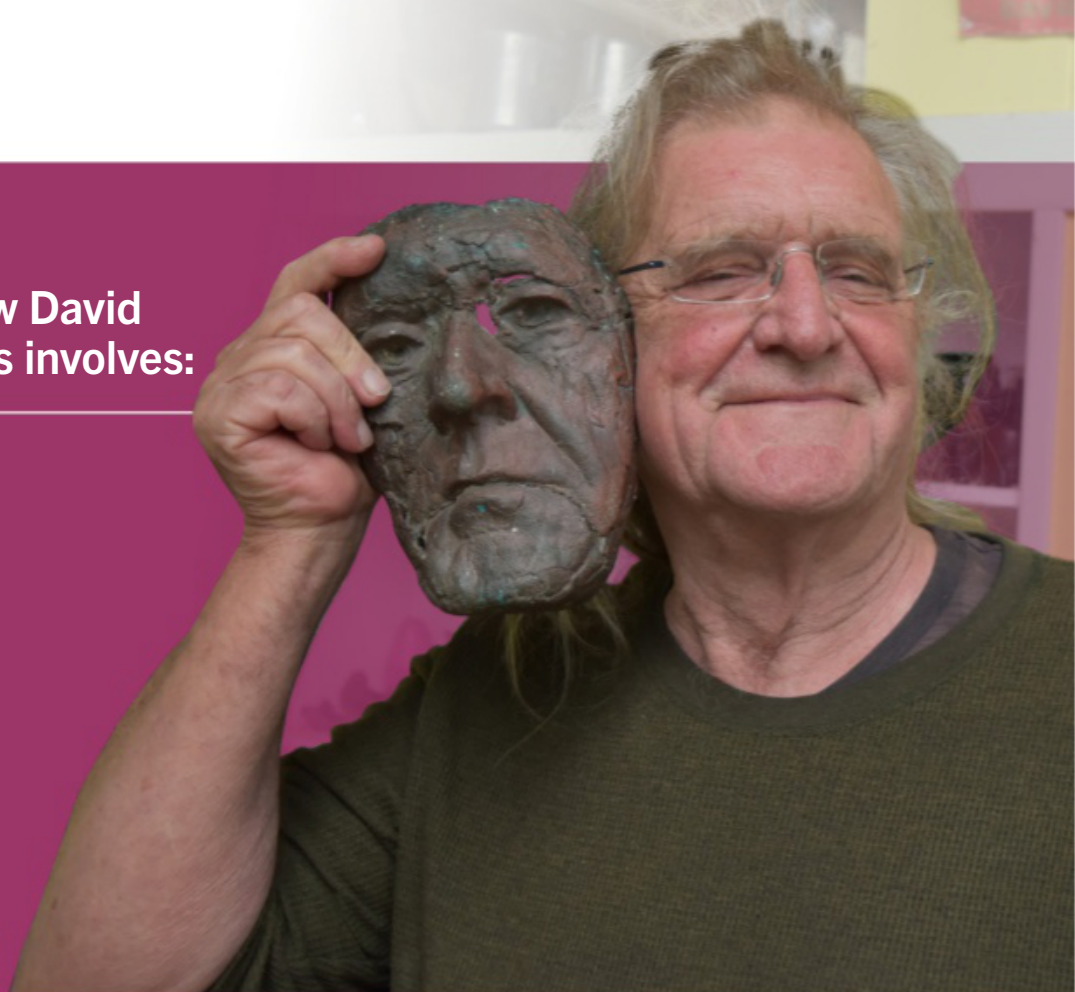
By Helen Frances and David Reid
Photographs: The Shed



The Reid Technique

Over three issues of *The Shed*, we will follow David Reid as he details the lost wax process. This involves:

- Making a rubber mould of a sculpture
- Making a wax replica and a wax cup base
- Building a ceramic shell around the wax
- Making a furnace out of fibre
- Burning out the wax
- Making the crucible with another cup
- Melting the bronze and pouring
- Finishing the bronze sculpture



In part one, David Reid took us through the process of making a wax model fixed to a sprue and cup. He also made a wax button cup that will become the crucible for the molten bronze.

In this, part two, David demonstrates the making of the ceramic shell and crucible followed by burning out or 'losing' the wax.

Before beginning the ceramic shell process, it is useful to note the weight of the wax used. You will put metal weighing at least 10 times this weight into the button crucible. The bronze casting process will be detailed in part three (*The Shed* issue 105).

It is also useful to affix three wax stumps to the bottom of the button cup crucible to raise it above the base

of the furnace when the bronze is melting.

Tools and materials you will need: long and short tongs; a grate; bricks; brushes to apply slurry; leather gloves; mask; LPG gas burner; hose and regulator; pot for the wax to fall into; pieces of bronze; a small piece of charcoal; the ceramic shell materials listed below. ►



Fine 50/80 Molochite is used for the first and second coats of stucco



Applying the first coat of slurry with a brush to the wax replica

“Check that it is not so hot as to overly soften the wax”

Drying box

Arrange a cardboard box on its side on a bench with a hair dryer blowing into the opening. If you set the hair dryer about half a metre back, this should achieve a temperature of around 20–25°C. Check that it is not so hot as to overly soften the wax. Adjust the temperature by changing the distance between the dryer and the box.

The first coat of slurry

David's special first coat of slurry allows for perfect surface detail on the casting. It is removable with a wire brush, so there is no need to sandblast as is necessary using other methods. Sandblasting loses detail.

The magic mix — formula for a single casting

Slurry 1

50ml of Ludox SKR colloidal silica — this can be used as a thinner to adjust the slurry consistency

25ml of isopropyl alcohol

One heaped teaspoon of graphite powder

Three to four heaped teaspoons of Molochite 200 powder, to make a light cream that will cover the pretreated wax well

Leave for 5–10 minutes to let the fine bubbles disperse

Slurry 2

Mix roughly equal volumes of Molochite 200 with Ludox colloidal silica to form a light cream slurry — no other components.

Ceramic sealing paste

Mix slurry two with a bit more Molochite 200 to form a thick paste for joining the button crucible to the ceramic mould. ►

Ceramic shell materials, formulas, and process overview

The process involves washing and drying the sprued wax sculpture and the button cup crucible then coating them both twice with slurry one and fine Molochite 50-80 or black magnetite. Ensure the layers are completely dry in between coats. Then apply three or four coats of slurry two, sprinkling with coarser Molochite 16-30. The wax of both the sculpture and the button cup is burnt out with a flame and a final coat of slurry two applied. Place pieces of bronze 10 times the weight of the wax in the crucible; affix the crucible to the ceramic mould sculpture.

The wash coat

Make up a solution of about 10 per cent detergent to 90 per cent water. With this, rinse over all parts of the sprued wax sculpture, except inside the button cups, and leave to dry in the drying box. This ensures that the first slurry coat will adhere perfectly.

Slurry and stucco chemistry

Molochite is calcined English china clay from Cornwall. It is non-expanding and can be heated up to 1300°C.

Graphite powder in slurry one acts as a deoxidiser and weakens the bond to the metal, also negating the need for a sandblaster post casting.

Isopropyl alcohol in slurry one makes the bubbles break, David discovered, on applying his knowledge of chemistry. Other formulas need to be left for hours to release any trapped air. The addition of alcohol reduces the wait from two days to 10 minutes.

Pouring fine Molochite 50/80 stucco over the first and second coats of slurry 1



David dries off the layers of the ceramic shell in an improvised drying box



Two ceramic shell replicas using Molochite 50/80 or black magnetite for the first two coats of stucco. David collects the magnetite from beaches with a magnet



After the first two stucco coats (on the left) David applies the following coats using coarser Molochite 16/30 (on the right)

Stuccoes

Stucco 1

Fine white Molochite (50-80), zircon, or black magnetite gleaned with a magnet from a west coast beach

(Zircon sand for the first and second coat stuccoes can be difficult to get hold of sometimes but magnetite sand is always obtainable from a black beach, using a magnet. Both do the job well.)

Stucco 2

Molochite 16-30, coarse grain

Method

First coat

Gently stir the first coat of grey slurry (slurry one) until it becomes smooth and homogenous — about the consistency of light cream — being careful not to trap air bubbles. If bubbles are present, they may attach to the surface of the wax and become extra cavities in the mould surface, leading to rough extra metal on the surface of the casting.

Re-stir and check its coating properties on a strip of pre-washed wax. Adjust as necessary. ►

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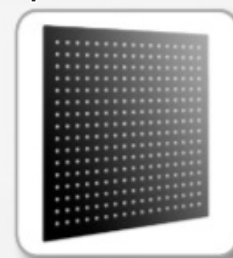
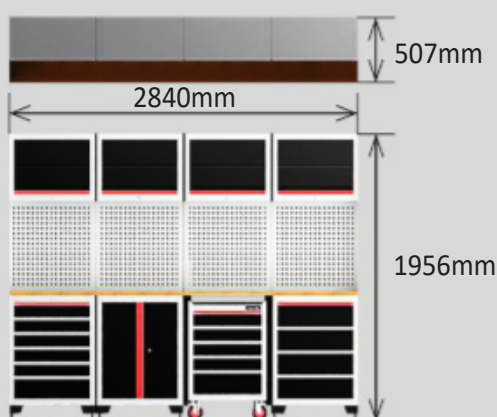


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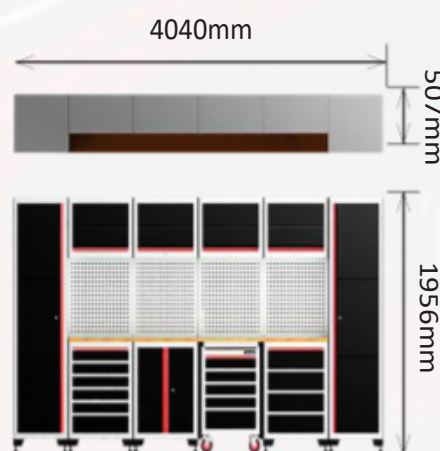


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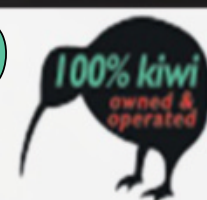
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Paint slurry one with a brush onto the sprued wax, covering the object, the sprue, and the outside of the button cup. If it fails to adhere on any area, use the brush to work it into the surface. You shouldn't see the wax showing through anywhere. Brush out or blow on any air bubbles, and be sure the slurry has worked into every detail. Apply more slurry over the painted area to give an even coat.

While the coating is still wet, sprinkle it all over generously with the finest white Molochite (50-80) or other fine stucco. The Molochite should adhere all over the surface.

Place in front of a fan, and leave 20–30 minutes in the moving air. It is very important that this first coat is well dried; if in doubt, leave it longer. Test it by wiping it gently with your finger. It should feel crisp and dry.



Palming some Molochite 16/30 ready for use

“It is very important that this first coat is well dried; if in doubt, leave it longer”

Slurry 2 is a mix of roughly equal amounts of Molochite 200 and Ludox to a light cream consistency

Doing a consistency and stickability test run of slurry 2





Painting the first coat of slurry 2 once the first two coats are dry



Pouring Molochite 16/30 over the sculpture replica

Second coat

Slightly thin the leftover first-coat slurry with a drop of Ludox. Apply a coating to the dried first coat, being sure it penetrates slightly. Stucco with Molochite 50-80 or magnetite again. It is best to leave it overnight to dry thoroughly.

Back-up coats

The following day, stir the secondary coat of white slurry until it is well mixed. When it is smooth, brush it over the dried primary coat, working it in well, and stucco with the Molochite 16-30. Dry well — approx. 30 minutes.

Repeat the coating twice more, this time by pouring and brushing over with slurry two and stuccoing with Molochite 16-30, giving a total of four or five coats, depending on the size of the mould. Be sure each coat is well dry before going on to the next step.

Finally, with a sharp point, scratch through the coating to the wax, making a 2cm x 2cm patch at the edge of the cup that has the casting attached. After dewax and assembly, this will leave a hole through which the metal can be observed as it melts.

The coating process can, of course, be sped up by drying at a higher temperature using, say, an air fryer set to 30°C or a constructed drying box. David recommends trying the slower way to begin with.

Repeat the above process for the button crucible.

The shells are now ready for the dewax stage.

Dewaxing method

Assemble the dewax stand so that the grate is stable. Bricks are handy for building a stand. Carefully connect the regulator to an LPG canister — these can be hired from a local distributor. Use soapy water on a brush to check for any leaks. Place an old saucepan (which will catch the wax) containing a block of wax to help prevent fire under the grate.

Place the ceramic sculpture shell to be dewaxed on the grate and light the torch; direct the flame onto the shell cup first. The torch may need some adjustment of position and strength of the flame to get a stable burn.

The flame should hit the outside of the shell, not the interior of the button cup. ►

“The coating process can, of course, be sped up by drying at a higher temperature using, say, an air fryer set to 30°C or a constructed drying box”

“Note: the dewaxing procedure can be a bit smoky, so do it in a well-ventilated space”

The wax of the sprue cup where the sculpture is joined should melt quickly and let the melting wax of the figurine (in this instance) flow through the opening. Starting with the flame on the cup, spiral slowly up the mould when the wax has started to drop into the pot. Sparkles indicate that the flame is at the right distance from the mould.

Wax should begin to drop out after a few seconds, and in a few minutes the shell should be completely dewaxed and free of black carbon deposit on the outside. It is best not to burn the shell longer than necessary, as this will cut down the efficiency of the first

coat, and perhaps roughen the mould surface.

Note: the dewaxing procedure can be a bit smoky, so do it in a well-ventilated space.

When the shell is dewaxed, remove it by gently lifting it with the tongs and setting it aside to cool on a fireproof place such as a dry brick.

Repeat this process with the button cup.

If you find cracking occurs regularly during the dewax process, try placing the assembled shell and wax piece in the freezer for an hour before putting it to the flame.

Make a de-wax stand with bricks and a grill

The wax crucible cup is also covered with slurry and the wax lost through the same process



Place the ceramic shell of the sculpture on the grate



... and burn out the wax starting slowly at the base

“This extra coat after dewax is very important, adding strength to the mould”



The wax has been burnt out of the crucible cup. It is now ready to be affixed to the ceramic shell of the sculpture

Mould assembly

When the shell is cool, carefully break out any ragged bits of ceramic that may be around the inside edge of the cup, taking care that none of the pieces you trim go into the mould. Break out the 2cm x 2cm patch at the edge of the ceramic cup, which you previously marked by scratching through the coating to the wax. This will leave the hole through which you can see the metal melting — as will be

detailed in part three, *The Shed* issue 105.

Check carefully for any cracks. If any have appeared — normally due to the assembly being left too near the furnace before dewax — patch them over with a little sealing paste, and dry it off with a flame. Use the slurry as sealing paste.

Repeat the above layering process for the button crucible, which you dewax as you did with the mould, as mentioned above in the back-up coats section.

One further coat of back-up slurry is now poured over or painted on. This extra coat after dewax is very important, adding strength to the mould.

Do not let any slurry get inside the mould, as this will scar the moulding surface. The reinforcing coat can be dried quickly with a flame, since there is no longer any wax to expand and cause cracking in the shell. ►



Bronze alloy — ‘a craftsman’s best friend’

Today’s bronze typically consists of approximately 88 per cent copper, 10 per cent tin, and 2 per cent zinc.

The earliest bronze objects contained around 2 per cent or less of tin or arsenic, it is thought due to trace metal content in the copper ore. Then humans discovered that adding tin or arsenic to copper increased its hardness and made casting much easier.

David finds many sources of bronze in second-hand shops and foundries, so unlike our ancestors, he rarely makes his own.

Bronze age humans must have discovered through experimentation that metal could be extracted from ore. Malachite, for example — a green rock from which copper is extracted — is found in places such as the Congo, Gabon, Zambia, Namibia, Mexico, and Australia. The largest deposit — and mine — is in the Russian Urals.

In his talk to the British Art Medal Society, 25 November 2015, David said, “If you were messing about 5000 years ago and you came across a seam of green rock, you’d take some home with you, wouldn’t you? I would, for sure. Then you’d analyse it, wouldn’t you? How would you analyse, 5000 years ago? You’d throw it in the fire to see what happened and how it burnt. Once you did that with enough carbon, and you blew on it a bit, you’d likely form copper. That’s probably how copper got started. They would have seen raw copper in ancient times and known a bit about it, so it wasn’t such a huge step.”

Tin is extracted from cassiterite, a crystalline mineral found in igneous rocks. Tin is found in places such as Bolivia, Cornwall, Thailand, Indonesia, Somalia, Peru, Russia, but today mainly in Malaysia. Zinc ore, often along with lead and silver, is mined in places such as Australia, China, Peru, and India.

Attaching the button cup crucible

If you have noted the weight of the wax on the cup or on a piece of paper, place at least 10 times this weight of metal into the button crucible, not forgetting a small piece of carbon or charcoal — about a cubic centimetre — in the bottom. If you haven’t been able to weigh the wax, just make sure you have an excess volume of metal compared to the wax, and note the weight of this metal going into the crucible.

If you have a number of alloys in stock — e.g. leaded gunmetal and silicon brass — be careful not to mix

these in the same melt. They are incompatible and can cause cracking in the casting.

Place the rims of the sprue cup and the button cup moulds together so that the edges of the cups fit as well as possible. Taking a little of the ceramic sealing paste, apply this to three points around the joint. Without moving the assembly, heat these gently with the torch flame to form spot welds.

When the welds are cool, apply more paste to completely fill in the gap and heat gently again to set.

An old brick or similar fireproof surface is a convenient place to do this. ►

Long tongs are essential to keep the hot stuff at a distance





Working out the volume of bronze required in case the quantity of wax wasn't noted



Weighing the bronze



Bronze has been placed for melting — this has to be done before joining the crucible to the ceramic sculpture part



Heating the furnace base to solidify the coats of slurry 2 and stucco 2



David's DIY drying box — a carton, fan, thermometer and heat gun

DIY air dryer

To construct an air dryer, David bought an air fryer. Unfortunately, it won't go below 60°C, so he used the box it came in and set up a more DIY type of drying box for which he can regulate the temperature. A heat gun, a fan, and a thermometer monitoring heat at 33° do the job, allowing him to quicken the drying time between coats instead of leaving each one overnight.



Furnace base and walls



Apply coats of slurry 2 and stucco 2 to the furnace base to make it solid

“Making the furnace as he goes, David cuts out squares and rectangles of the ceramic fibre wool — a base, three sides, and a muffle top”

Making a dome

An open dome that keeps in heat and offers support is used when processing taller moulds such as this sculpture.

To make a dome use fibreglass matting — without resin — soaked in slurry two around a thin wax form.

“It needs a couple of days to dry before dewaxing and hardening by heat,” David says. “Once formed, quite thin, and heated, other coats can be applied for strength.”

Building a furnace

After using bricks and mud, which robbed a lot of the heat from the furnace chamber, David discovered woolly ceramic fibre when one of his students made a thin-walled, ceramic fibre hot box. Making the furnace as he goes, David cuts out squares and rectangles of the ceramic fibre wool — a base, three sides, and a muffle top. ▶



Dome and furnace assembled with ceramic shell and crucible ready for the next stage — melting and pouring the bronze

Inside of the ceramic shell with the wax removed — the molten bronze will flow down into the shell and take the shape of the mould



The crucible being joined to the sculpture ceramic shell



David using a pencil lighter to harden the joins

Materials

- One roll of ceramic fibre blanket
- Stanley knife or other cutting tool
- Slurry 2
- Molochite 16-30

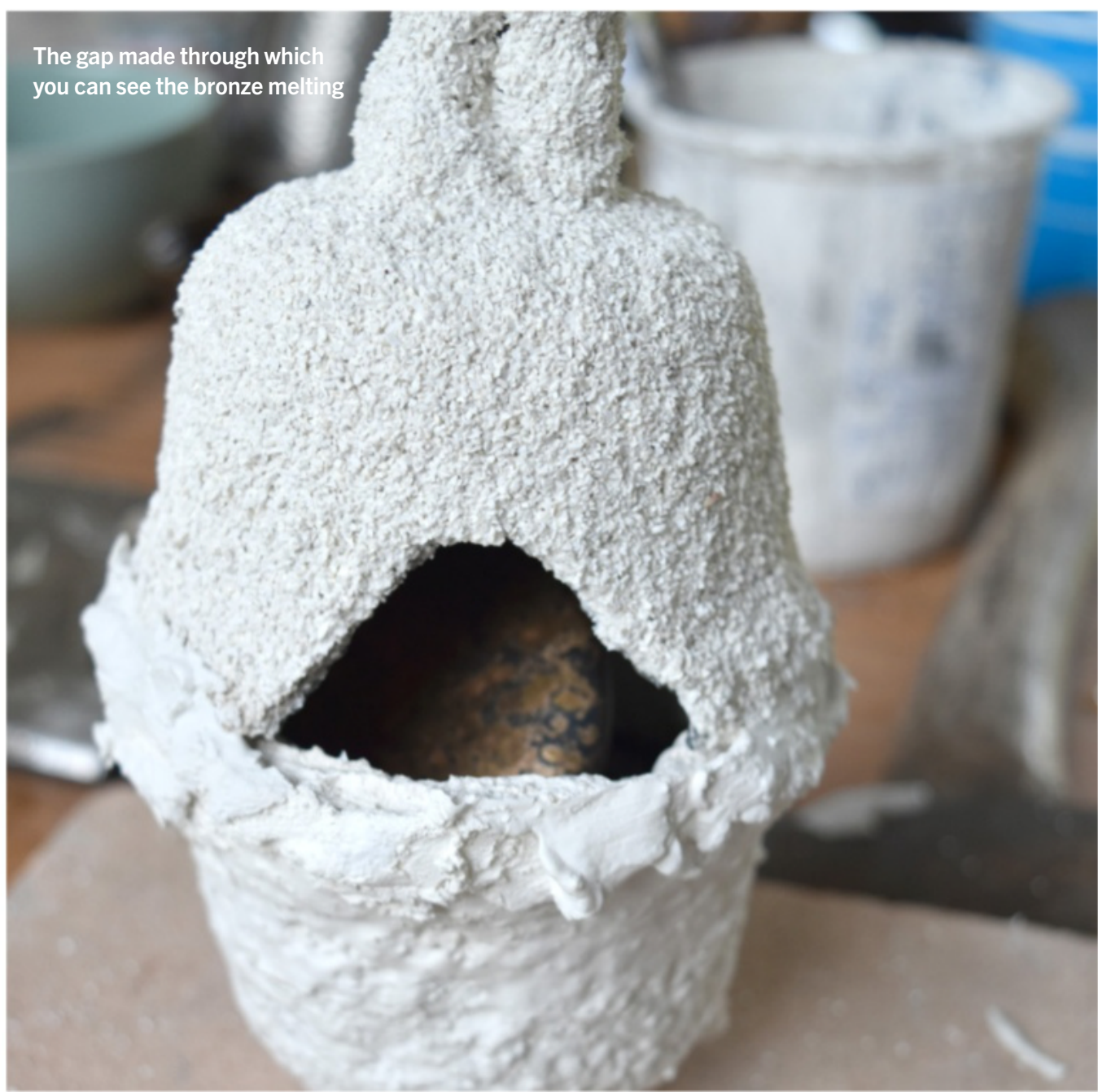
Apply three coats of slurry two and Molochite 16-30 to the base plate. These can be dried initially with a gentle flame, and will fire up strong during the first casting session. This provides a solid base for the mould to sit on during firing.

The top cover is thinner than the sides, and is made by splitting the ceramic fibre wool. It curves over the top of the dome.

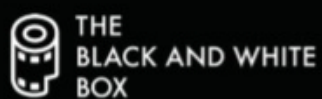
Arrange the furnace pieces on top of the grate, and the casting process is almost ready to begin. 📁

In our final instalment, part three, in the next issue, David will demonstrate how to fire, melt, and cast the bronze held inside the crucible, followed by finishing processes such as patination.

The gap made through which you can see the bronze melting



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NOT A DECISION TO BE TAKEN LIGHTLY

First step in building your own house: take an aerial
photo of the section from a parachute . . .

By Mal McKee
Photographs: Mal & Natalia McKee

This was the aerial-
reconnaissance photo I took
from under my parachute,
scoping out my plot; where I
used to live and the planned
plot over the fence outlined in
red — beats Google Earth for
clarity when you zoom in



So, you want to build your own house — yahoo. Hopefully it will be as rewarding as it has been for me building ours, but hopefully with substantially fewer dramas.

Just to keep it interesting, my wife and I ended up doing things a bit back to front: garage, then honeymoon, another garage, then marriage, then kids, and now the house!

First things first

Stage 1: Planning and building the two garages — because man caves are important, right? The dramas and delays experienced, even after extensive planning, could not be predicted.

In 2005, I was renting a Nelson design former Lockwood show home in Glenorchy. I really liked it and would have loved to own it, but I would want the lounge to be a bit bigger and there was some wasted space that could be used for another bedroom to join the garage, etc. etc.

At the time, a new subdivision was being built over our fence. The sections, of approximately 822m², were selling for \$350K! Back then, as a poor skydiving instructor — but rich in life — I thought to myself, “Well, I’ll never be living there, will I?”

Fast forward to 2009, the slump in the housing market, and a change to an

occupation that paid me more. I did my homework and went land shopping — on that same subdivision.

Unusual site scoping

To scope things out, I did a skydive, opened my chute early, and took aerial photos with my zoom lens — beats Google Earth for clarity. The vacant section over our fence wasn’t actually for sale but I made contact with the owner through the council and began negotiations. My third offer, generous at the time — with financial conditions on a promised septic system — was finally agreed to. This all took over a year but the deal was finally done.

Patience, young Skywalker, that was just the first bit. The ‘financial conditions’ in the purchase gave me five years to get the septic system installed. I’m no computer wizard, but my new job was teaching me how to use Excel and also how to draw basic pictures to complement my reports. Some 3D CAD skills would have been nice, but I just grabbed a poor plan of my rental house off the net and decided to improve it. Drew around the walls, popped the section outline on, and deleted the original. Now, with known dimensions, I was able to make the most of the section and run to my boundary limits, making little improvements here and there to come up with my design and the best use of the section. ►



The clean slate I started with — we have potential here

“Essentially making a giant swimming pool but keeping the water on the outside”

Good old OE

Working out of Scotland at the time, I was seeing a lass from Slovakia and ended up visiting Bratislava. One of her friends was married to a Kiwi and they had a house on top of a concrete garage, which happened to be in the flood zone on the bank of the Danube River. He gave me the guided tour and showed me their bone-dry waterproof garage, which had recently survived a two-metre flood!

“Hmm, I could do that back home,”

I thought, “making better use of my limited-sized section.”

After all, I needed to build within my recession plane — the invisible imaginary box you have to build within — so two storeys were impossible. Therefore, a plan was made to build a waterproof garage that was three-quarters underground and plonk the house on top — essentially making a giant swimming pool but keeping the water on the outside. Our section is also in a possible flood zone.

Garage number one: major progress — we have a roof



Below: Garage number one taking shape; there are worse views out there



Give it a whirl

In 2014, I purchased a simple 9m x 7.2m kitset garage and decided I'd give it a go — I'm a former aircraft engineer so I thought it shouldn't be too much rocket science.

I managed everything myself except the actual placement of the stronger rib-raft concrete floor, which local Queenstown concrete placer, Mana, took care of — great job at a fair price; highly recommended. However, building this simple, square kitset garage taught me I shouldn't really be the one to build the house; I'm just too slow and fussy.

Five years crept up on me. I ended up installing the septic system at four years, 11 months, and three weeks, thus keeping my end of the contract — another drama that finally ended in my favour in 2019; patience, young Skywalker.

Marriage calls

By 2014 I was with a new lady, a Russian. Natalia had agreed to lower her standards enough to marry me. At this time we were in house negotiations with the local Lockwood dealer — not good — and then Fraemohs Homes in Christchurch with my plans. Initially we chose Fraemohs, but it seemed that every time we spoke with the new young sales guy, the price increased by 10 grand — and we weren't doing anything different — so negotiations were not going well.

Not rubbishing anyone, but that was our experience at the time. I think both Lockwood and Fraemohs are great New Zealand-made products.

“It seemed every time we spoke with the new young sales guy, the price increased by 10 grand”

In late 2015 I did a job on an American oil rig in Australian waters. There were lots of magazines on board and I came across a US generic log-home magazine.

I had always wanted a log home but somehow thought they were out of my price range. I saw a nice 1600ft² home, complete, for US\$37K — wow, but how old was the magazine? Only two months!

“Right, this needs more investigation,” I thought.

So, using the plans we had had



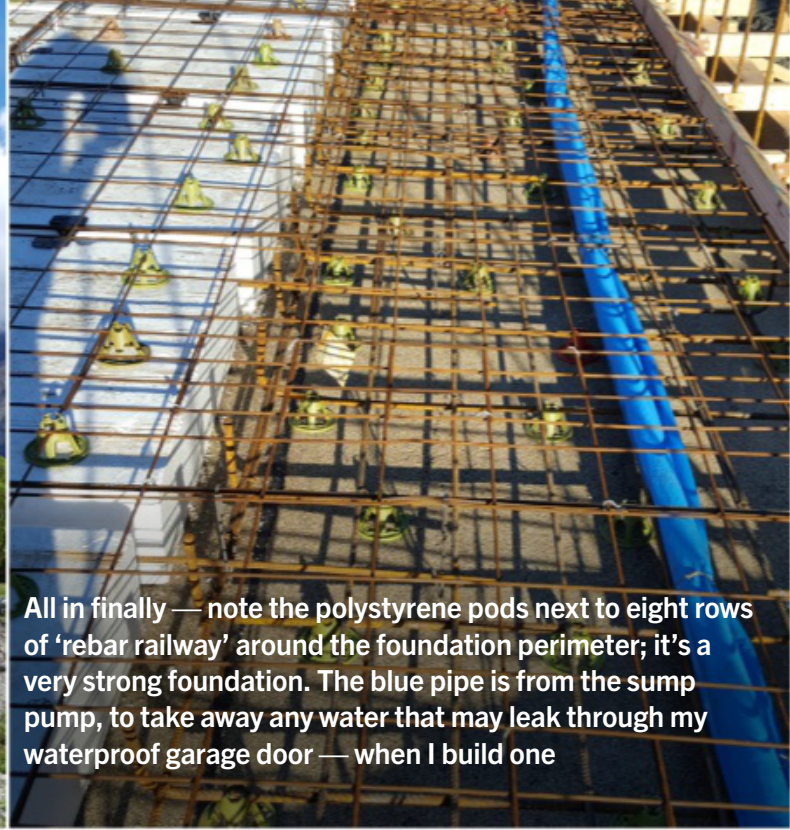
Garage number one is up; now I have a wife to help with garage number two — she loves it

Oh the planning — there was miles of it





Steel delivery — kilometres of it



All in finally — note the polystyrene pods next to eight rows of ‘rebar railway’ around the foundation perimeter; it’s a very strong foundation. The blue pipe is from the sump pump, to take away any water that may leak through my waterproof garage door — when I build one

professionally drawn up, I made a generic email and sent it away to 18 log-home manufacturers in the USA and Canada, and, just for good measure, included a few in Aussie and NZ.

First cab off the rank

Log Cabin Homes in America replied within five minutes!

“Thanks, I’ll get onto that quote later this week,” he said.

Five minutes later he emailed again, “Forgot to tell you; we have a special on at the moment — half price and a free double garage!”

I kid you not.

Well, long story short, bye-bye Fraemohs and hello Log Cabin Homes. This began the next frustrating drama. Patience, young Skywalker. It was two years later, in January 2018, and finally our 150m², four-bedroom, custom kitset, family log home was delivered to the vacant section next door — thank you, Vicki, for the use of that. Shipping was two 40ft containers, full.

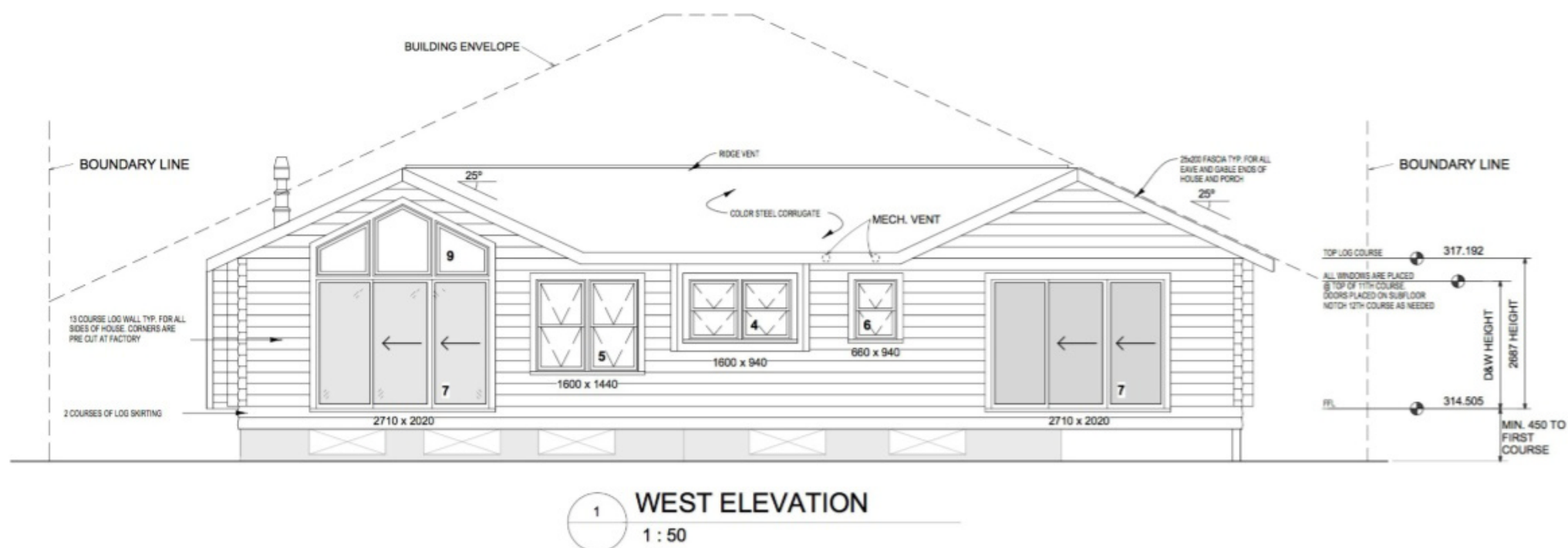
The cost, including shipping, insurance, kiln-drying — we traded in the double garage for that expense — customs, GST, and final delivery from Dunedin to site, was NZ\$145K. Not bad; I don’t think you could do that now.

Next drama! A kitset, you say? As it turned out, there were only 26 pieces of wood in the entire house that did not ►



My workout, bending some of the 3.5km of rebar

“We have a special on at the moment — half price and a free double garage”



“So it was more of: ‘Here’s all the bits, mate; chop them up and make a house out of that lot,’ and so not much of the ‘kit’ in kitset then”



Left: The finished foundation after busting my ass for 36 hours straight — awaiting concrete



Corner detail; neat as you like as far as laying rebar goes



The finished pour; wood covers the drain inside the door which will eventually have a float-activated sump pump

Exciting watching concrete dry — when it's yours; all that lovely rebar, never to be seen again — at least I know it's done right

► need measuring and cutting. So it was more of: “Here’s all the bits, mate; chop them up and make a house out of that lot,” and so not much of the ‘kit’ in kitset then.

Building consent

After the small initial deposit, Log Cabin Homes had wanted a 50 per cent deposit just for the plans. That took a lot longer than anticipated as well — customer service through the US is normally great.

We needed the plans before we could proceed. We also needed a New Zealand engineer to design the three-quarters-underground garage and to convert and certify everything imperial and US to metric and NZ standards for the local council building consent. Other dramas

there; in the end I did most of the imperial to metric conversions.

In 2016 we completed the three-quarters-underground garage, again using Mana as the concrete placer —

awesome job again on another strong rib-raft floor. We had a few design and build dramas there, too — design engineer pricing climbing to more than twice what was quoted.



Look what we built: wall's up and awaiting the block-fill concrete to bury the final 3.5km of rebar forever; the vertical lines are the control joints — eight joints in total





Ta dah, garage number two finished — well, the floor and walls anyway; and the polystyrene on the outside walls, mainly to protect the \$20K of waterproofing membrane but I'll get a little insulation from it, too



Natalia made a wonderful job of derusting, inhibiting, and priming the five beams



Beams going in; they easily weigh more than 500kg with the wood and bolts added



More beams — note the 45-degree braces I welded and bolted to the walls to enable 100 per cent of the backfilling to be done

Eventually, in March 2017 — a lot later than planned — we got the house plans stamped ‘ready to proceed’ from the council. We were now married and expecting our first child.

A bit of luck

Looking back at the photos, we know we could never have built either the house or garage so easily had the sections on either side of us not been vacant. The hole was simply massive, and we needed somewhere to pop the dirt and the kitset house.

The entire concrete garage is built like the proverbial brick you-know-what. More than 3.5km of rebar in it, all laid and wired by yours truly. As anyone who has scheduled concrete and pump trucks for a pour knows, you need to have the prep all sorted. With both my garage floors, I somehow managed to take it to

the wire; I was up working through the night by floodlight, feverishly wiring rebar — so much so that on the second garage pour I managed to give myself carpal-tunnel syndrome on my wrists. But I got it done!

I had thicker, 250mm cinder-block walls and massive 360UB57 I-beams to make the entire 120m² garage pillarless. It was also entirely waterproofed — \$20K for that; ouch! I couldn't build the house first though, then dig the second garage, so I had to haemorrhage the money for that.

I tried to order the 360UB52 I-beams that had been specified.

“Sorry, we can only supply you with 360UB57,” said Fletcher Steel. “We'll do them for the same price, though.”

“Sold,” I said immediately, knowing I'd have a stiffer and stronger foundation supporting the house — a small win. ►



“It paid off,
though —
all 26 bolts
slipped in
within a
poofteenth
no
worries”

DIY time

I purchased a \$300 manual rebar bender/cutter and that saved much on paying others; it also allowed more precise placement and less wastage of those 3.5km of rebar. I also purchased a decent welding machine for the I-beam webs. This was a time-consuming task, but I made big savings because of it. Natalia did a great job of descaling, corrosion-proofing, and priming the beams. Note for others: anything six metres or less seems to be no problem for delivery cost wise. I organised a local rock truck travelling one way empty to grab our I-beams — another small win.

The combination of welding then drilling and lining up the I-beam holes over the 7.5m spans was exciting. Measure twice, cut once, they say. I lost count of the measure part. It paid off, though — all 26 bolts slipped in within



a poofteenth no worries. We used a local mate and a JCB telehandler to position the 430kg beams. Surprising myself with the hole accuracy, I was a seriously happy man at the end of that day; much beer was had.

She's a pretty big job

Because I was the title contender for world's slowest builder, we 'did the right thing' and hired a builder and his team. We finally got the house project under way in February 2018. ►



Small scaffold — beer-hired from a local painter mate; it was invaluable during the build. Cheers, Gerry!



Some of the 31 piles that was the kitset log home — sure was handy having the vacant section next door

Smiling; I can't believe all the 26 bolts just slipped in — yay, the measuring was well worth it. You can just see the white house I used to live in under the arm of the JCB



The Windwood Log Home, an example of one of the many log cabins offered by Log Cabin Homes in Rocky Mount, North Carolina, USA (www.logcabinhomes.com)



Above: One-third of the house is on piles — now they're in; the alcove in the concrete garage will be the internal stairwell access

Below: All 180m² of man caves complete; now to the house build. The American wood joists looking pristine; bare steel in the foreground will be the steel and concrete 7m x 3m deck, which is also the roof of the garage workshop area below

The fairly square, easy, straight, flat floor was the first part to be built, and I was helping with that. Then, while I was away working for two months to try and pay for it all, and the build was unsupervised, things got away from us a bit. Let's just say that upon my return in May we were unable to afford the services of said builder and we went our separate ways, all good. However, we couldn't find a competent, available

builder — we can help in October next year was one answer.

By mid June, when winter had well set in, we were saying that I was going to have to build this thing myself. The completed floor was taking quite a hiding from the weather, so the world's slowest builder had to get cracking, and the sooner the better.

On to stage two: building our family log home. 🏠





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PART 2

TALES FOR MAKERS

In this adventure story based on fictional technologies, Ray looks for his son, Tommy, who disappeared after fiddling with an old parking meter

By Enrico Miglino
Photographs: Enrico Miglino



In this second episode (see *The Shed* Issue No. 103 for part one), Ray faces challenges as he searches for his son.

An intelligent drone impersonates the dominating technology he meets. I think that any maker at least once in his life would spend some time thinking about doing some hacking on this fascinating world. The second part of this project, presented here, will inspire all those makers fascinated by these futuristic flying objects. Indeed, I am one of them.

If you plan to make your own project inspired by the Ray adventures, don't forget to explore the Tales for Makers challenge running until the end of August on element14 (<https://community.element14.com/challenges-projects/project14/tales4makers>).

Drone patrol

Ray walks around, exploring the abandoned amusement park. Soon he discovers it is more populated than expected — not crowded but full of strange characters. He finds barracks and carousels, shooting galleries, and an enormous roller coaster.

As he moves towards the abandoned ticket office, a voice welcomes him, saying that she is Sonya and that she is his cyborg host. She asks how she can help him.

Ray explains that he is searching for his son. As he explores, he studies every detail, searching for clues suggesting the presence of Tommy. Looking through a window, he sees someone. Is it Tommy playing video games? Excited, he enters the room but he finds it empty.

Ray meets Sonya again near the building and asks for an explanation. She explains that the windows have a special 'delay glass' that shows anyone who looks through the window events that have already happened.

What is this noise?

As Ray explores the surrounding environment, he keeps hearing a strange buzzing overhead, but he can see only the blue sky and white clouds. On meeting Sonya again, near a shooting gallery, he asks her about the noise. She explains that it is one of the drone patrol devices that monitor the park to keep it secure — not easy to see because they blend in with the surroundings. Ray starts trying to get answers to the many questions in his mind, but Sonya is busy and disappears again.

Ray sees many strange engines and automata in the park. He begins to check every detail of them; he is sure these engines hold the key to this strange world.

The third time Ray hears the buzzing, he sees the source: a drone a few metres over his head. He studies the drone

**Is it Tommy playing video games?
Excited, he enters the room but
he finds it empty**

signals with his portable Wireshark app, discovering enabled Wi-Fi and a Bluetooth connection — good to know; may be useful for the future.

Not scary

Meanwhile, Tommy feels happy and relaxed. He walks inside the Horror Tunnel, more curious than scared. He always recalls his father's words of wisdom: "If something scary and inexplicable happens, look deeper; there should be a scientific explanation."

Tommy is not worried; he knows

this was an amusement park, not a dangerous place. He is following the suggestions on the flyer he grabbed at the entrance to the BDTH 6159 Amusement Park: "Visit our suggested best-of places at the park, and enjoy your time." It is full of good information and explanations.

Following the correct path

The Horror Tunnel entrance is marked as the next step when exiting the Mirror Labyrinth. It is not easy to follow the right path but, thanks to the

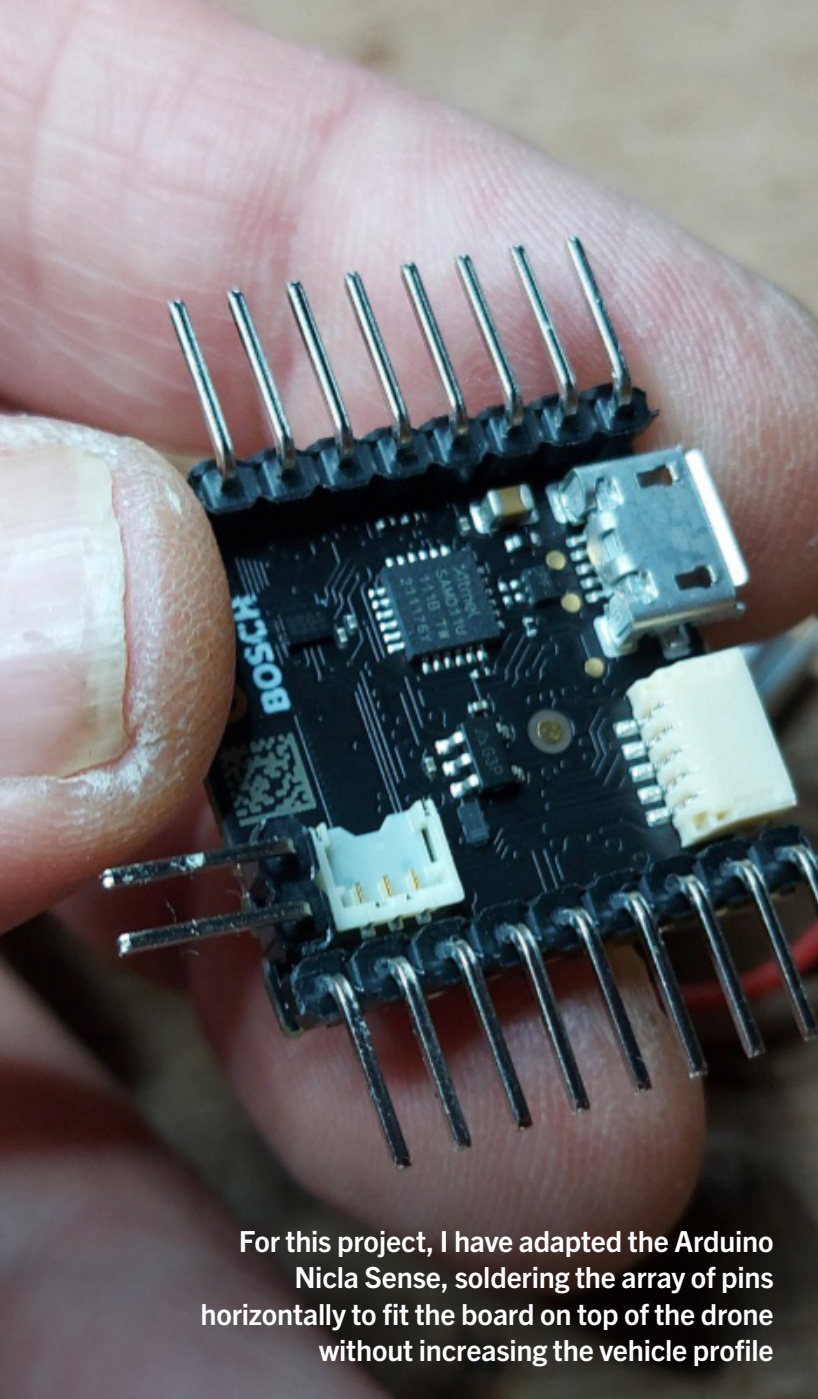
suggestions on the flyer — it is a sort of 'how-to' — the route to the exit is not too complex.

Always attracted by the challenge of labyrinths, Ray does not hesitate; he enters the Mirror Labyrinth as soon as he sees the large glass door. He is almost sure Tommy will have done the same.

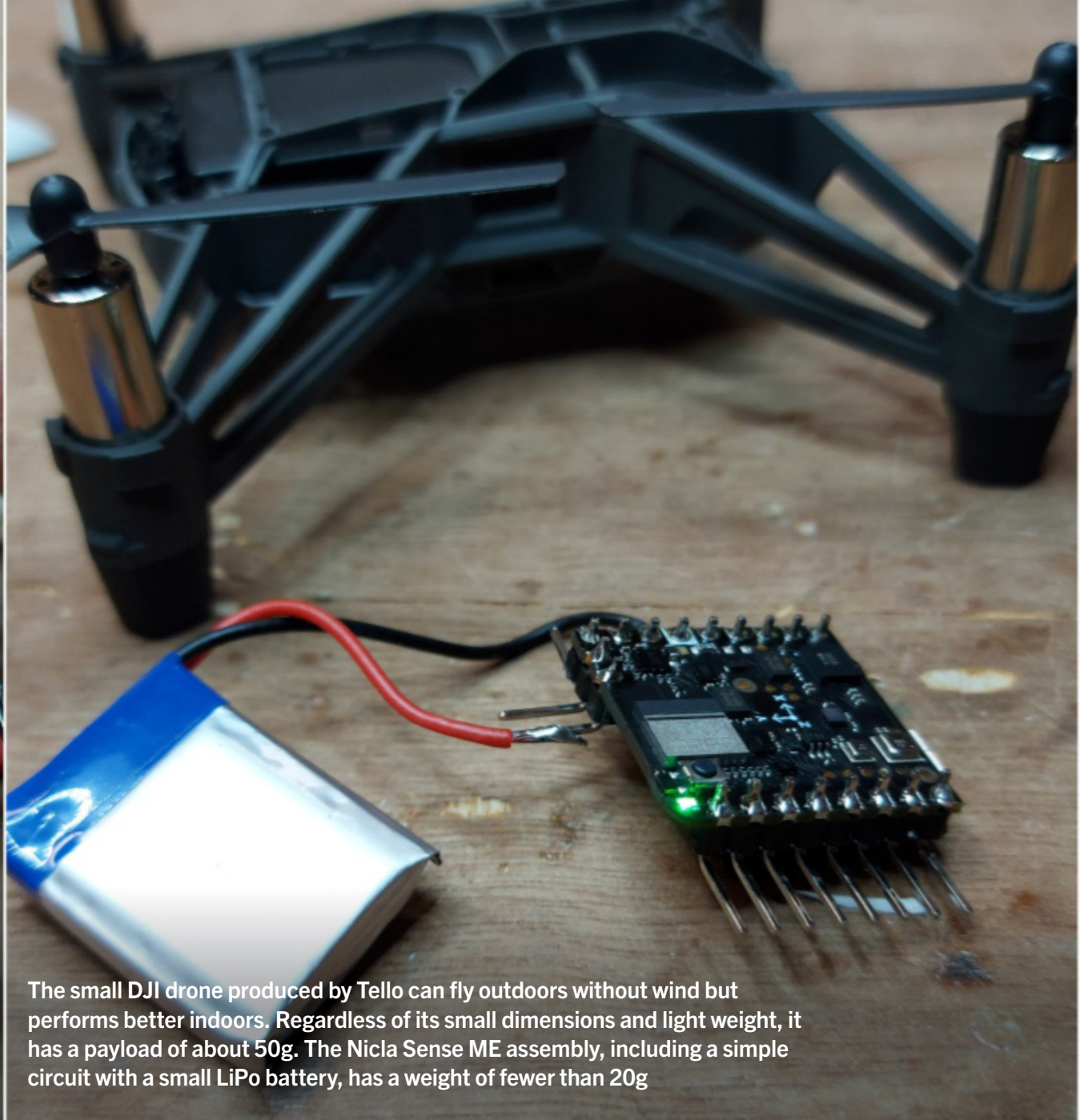
Once, when he was discussing labyrinth-solution techniques with Tommy, Ray explained that the secret to exiting in a short time is to leave a signal behind to identify the right path and the points already walked. ►

A blue and black drone with red and blue lights is flying over a beach at sunset. The drone is in the foreground, flying towards the right. The background shows a beach with some people and a sunset sky with orange and blue clouds.

It is not necessary to own expensive professional devices to do interesting experiments with drones and AI, including experimenting with machine learning on tiny devices. As we will see in this new episode of Tales for Makers, a cheap drone and a lightweight Arduino last-generation board are more than sufficient



For this project, I have adapted the Arduino Nicla Sense, soldering the array of pins horizontally to fit the board on top of the drone without increasing the vehicle profile



The small DJI drone produced by Tello can fly outdoors without wind but performs better indoors. Regardless of its small dimensions and light weight, it has a payload of about 50g. The Nicla Sense ME assembly, including a simple circuit with a small LiPo battery, has a weight of fewer than 20g

Unfortunately, that is not possible in this case; the mirrors are confusing, and sometimes they do not reflect the expected image.

Hacking the drone

Still lost after half an hour, Ray remembers the security drone patrolling the top. Hacking the drone signals, he discovers that the Bluetooth connection sends the current drone orientation, so he starts to keep track of it, moving around as much as possible, following any direction.

One hour later, Ray is in front of the exit door.

There are two signs: “Exit” and “Continue”. He follows the exit sign, missing Tommy in the Horror Tunnel by a few minutes.

Unfortunately, Ray does not have the welcome flyer that Tommy has.

The project

As a maker and drone aficionado, I have hacked several kinds of drones in the past. This issue’s project hacks the high-tech but cheap Tello DJI drone: (www.ryzerobotics.com/tello-edu), adding a new feature using — this

In addition, complex features can be added to the drone autonomous flying writing Python programmes

time in a very different way — the Arduino Nicla ME that I introduced in the previous issue.

The idea is to create an automatic system to monitor the environment of nearby areas, thanks to the sensors on board the Nicla.

I will present this project in two parts: in this first part, I will introduce how I have done the hack and created the data collection; in the next issue, we will see how to use the Neuton AI platform (neuton.ai).

Autonomous flying

As the Tello drone is sold on the educational toy market, it includes some characteristics that, in my opinion, make it unique. The drone is controlled through a Wi-Fi connection; it can be programmed to execute a predefined path with a

complete set of instructions.

For youngsters, it is possible to use the object block application Scratch developed by MIT; detailed instructions are available on the Tello website. In addition, complex features can be added to the drone autonomous flying writing Python programmes.

This is what I have done. The role of the drone is to drive the Nicla board to ‘sense’ the environment nearby — air quality, CO₂ level, temperature, pressure, humidity, etc. — always following the same path: a drone patrol device.

The Python software should run on the computer to which the Tello is connected. The programme receives the path information — height, speed, direction, rotation angle, etc. — reading a Json file like this one following:

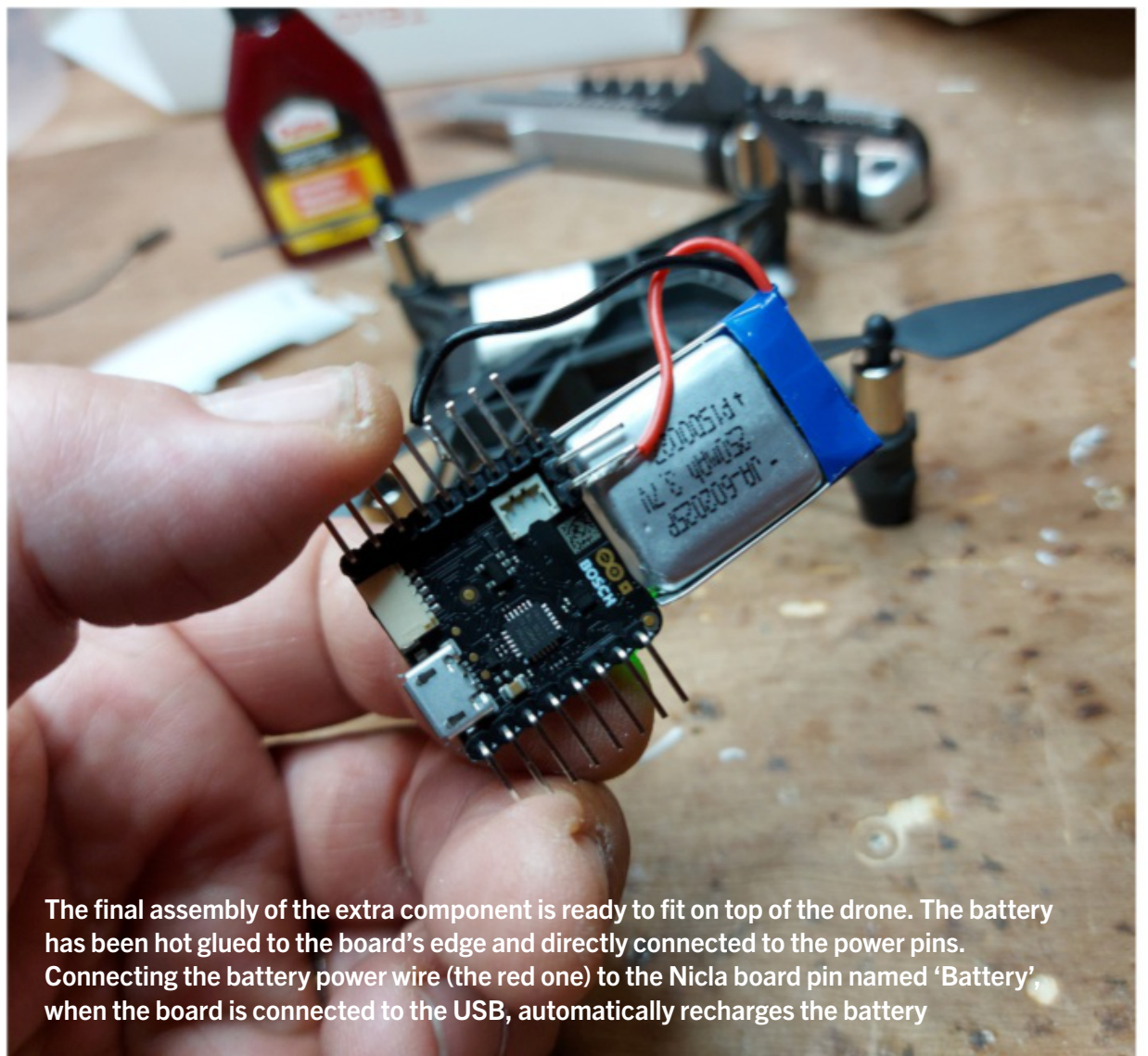

```
{
  "loops": 1,
  "fly": [
    "speed 100",
    "takeoff",
    "up 50",
    "land"]
}
```

The complete Python programme is available on the GitHub ‘drone-patrol’ repository (<https://github.com/alice-mirror/drone-patrol/tree/master/DroneControl>)

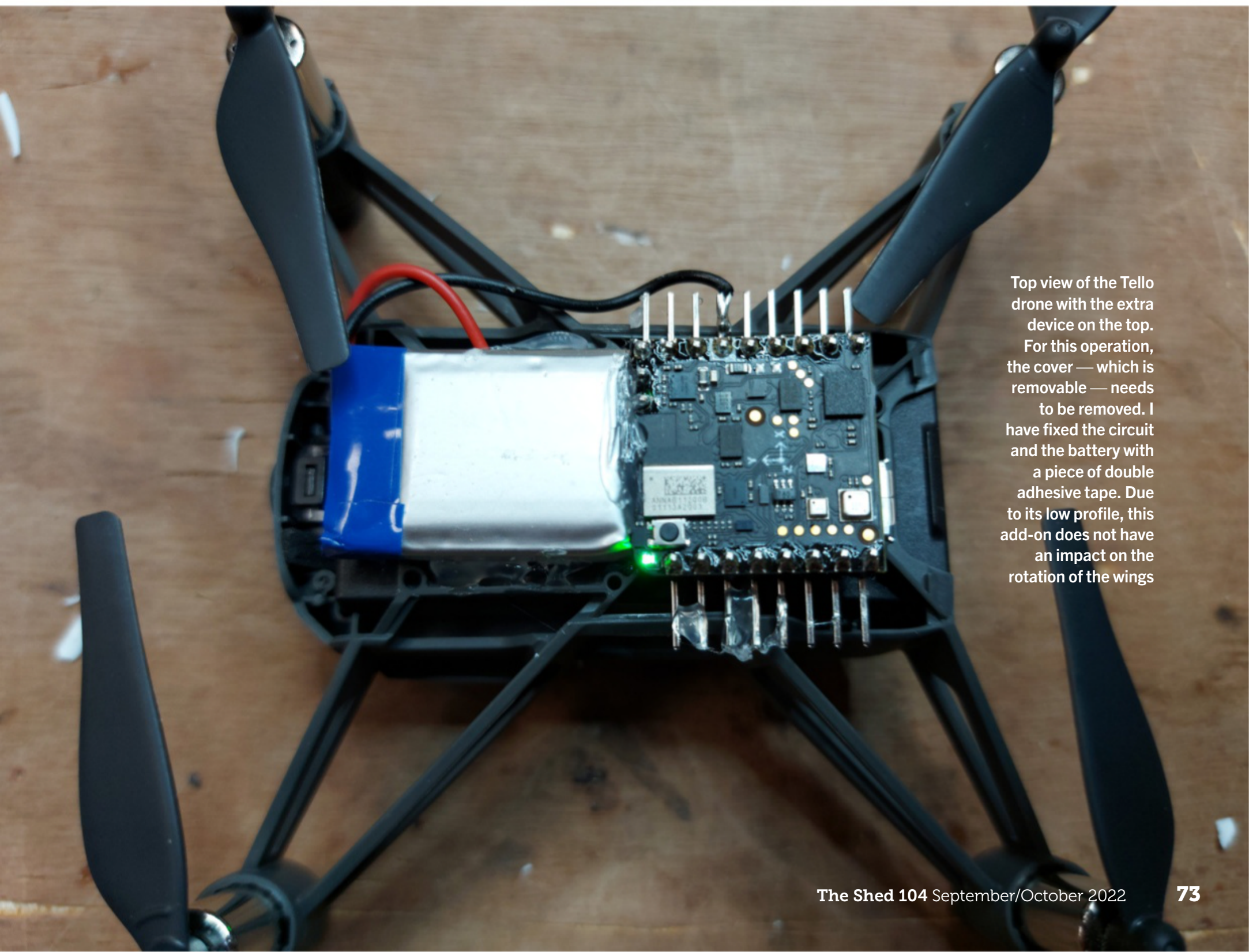
Assembling the board

As shown in the images, I have removed the coloured top cover of the Tello drone and replaced it with a low-profile circuit built with the Nicla Sense ME board and a small battery.

Thanks to the low power of the board, a small and lightweight 250mA LiPo battery keeps the Nicla board alive for over an hour. ►



The final assembly of the extra component is ready to fit on top of the drone. The battery has been hot glued to the board's edge and directly connected to the power pins. Connecting the battery power wire (the red one) to the Nicla board pin named ‘Battery’, when the board is connected to the USB, automatically recharges the battery



Top view of the Tello drone with the extra device on the top. For this operation, the cover — which is removable — needs to be removed. I have fixed the circuit and the battery with a piece of double adhesive tape. Due to its low profile, this add-on does not have an impact on the rotation of the wings

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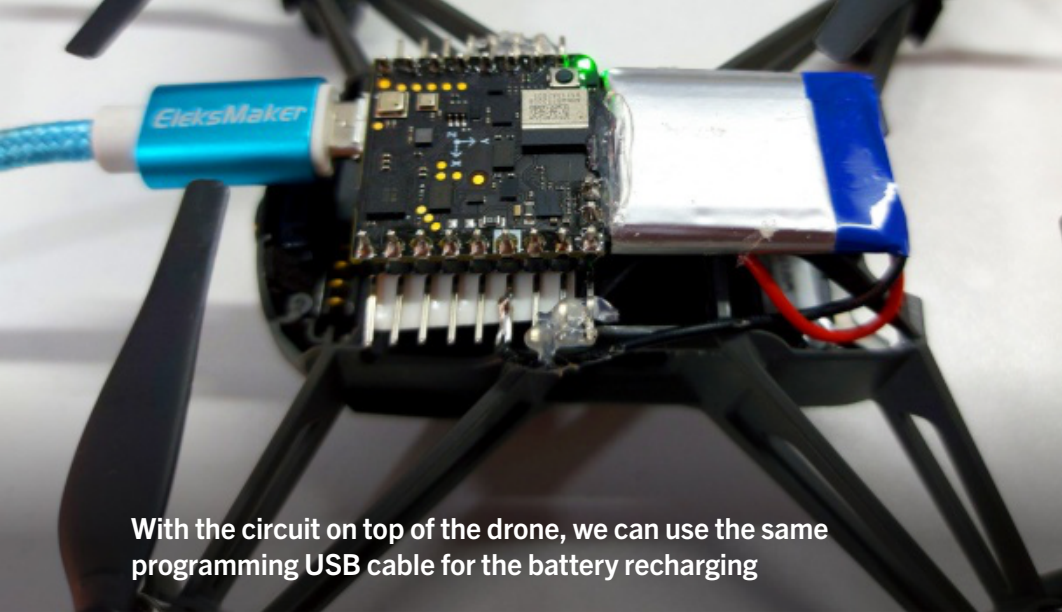
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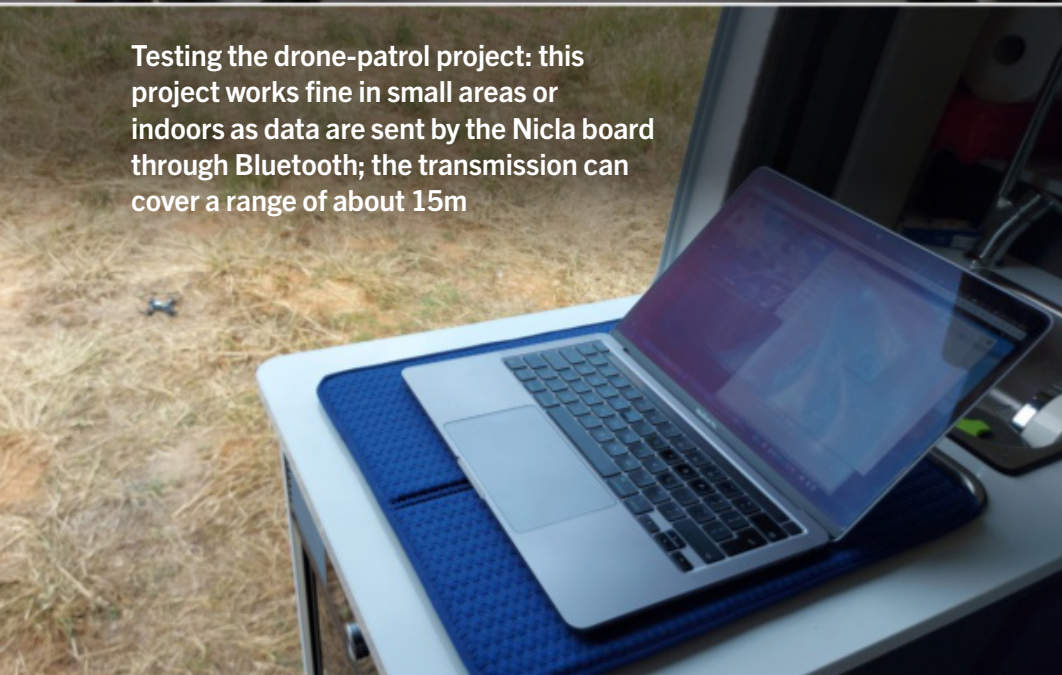
We have everything for all of your needs. Just open <https://avxlive.icu>



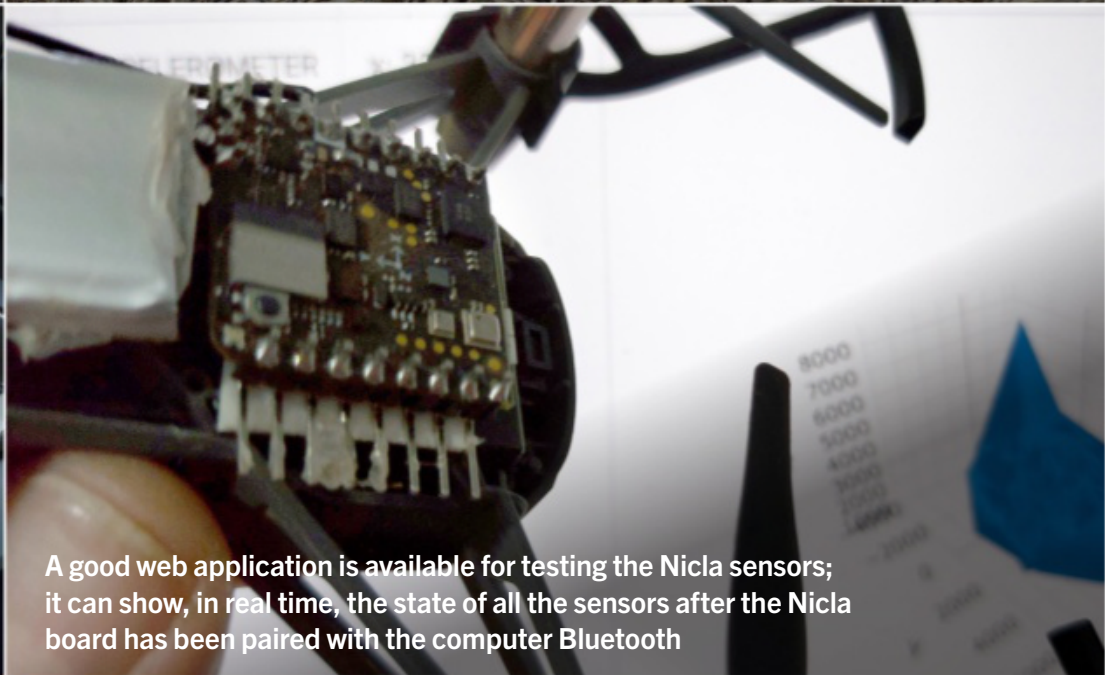
With the circuit on top of the drone, we can use the same programming USB cable for the battery recharging



The modified version of the Tello drone on the ground outdoors, ready for the first test flight



Testing the drone-patrol project: this project works fine in small areas or indoors as data are sent by the Nicla board through Bluetooth; the transmission can cover a range of about 15m



A good web application is available for testing the Nicla sensors; it can show, in real time, the state of all the sensors after the Nicla board has been paired with the computer Bluetooth

While the drone flies along a path controlled by the Python programme via the Wi-Fi connection, the Nicla board collects the environmental data, sending them to the computer via the Bluetooth connection.

I have developed a Go language web server and a set of Javascript components to achieve this goal. The server is available on the GitHub drone-

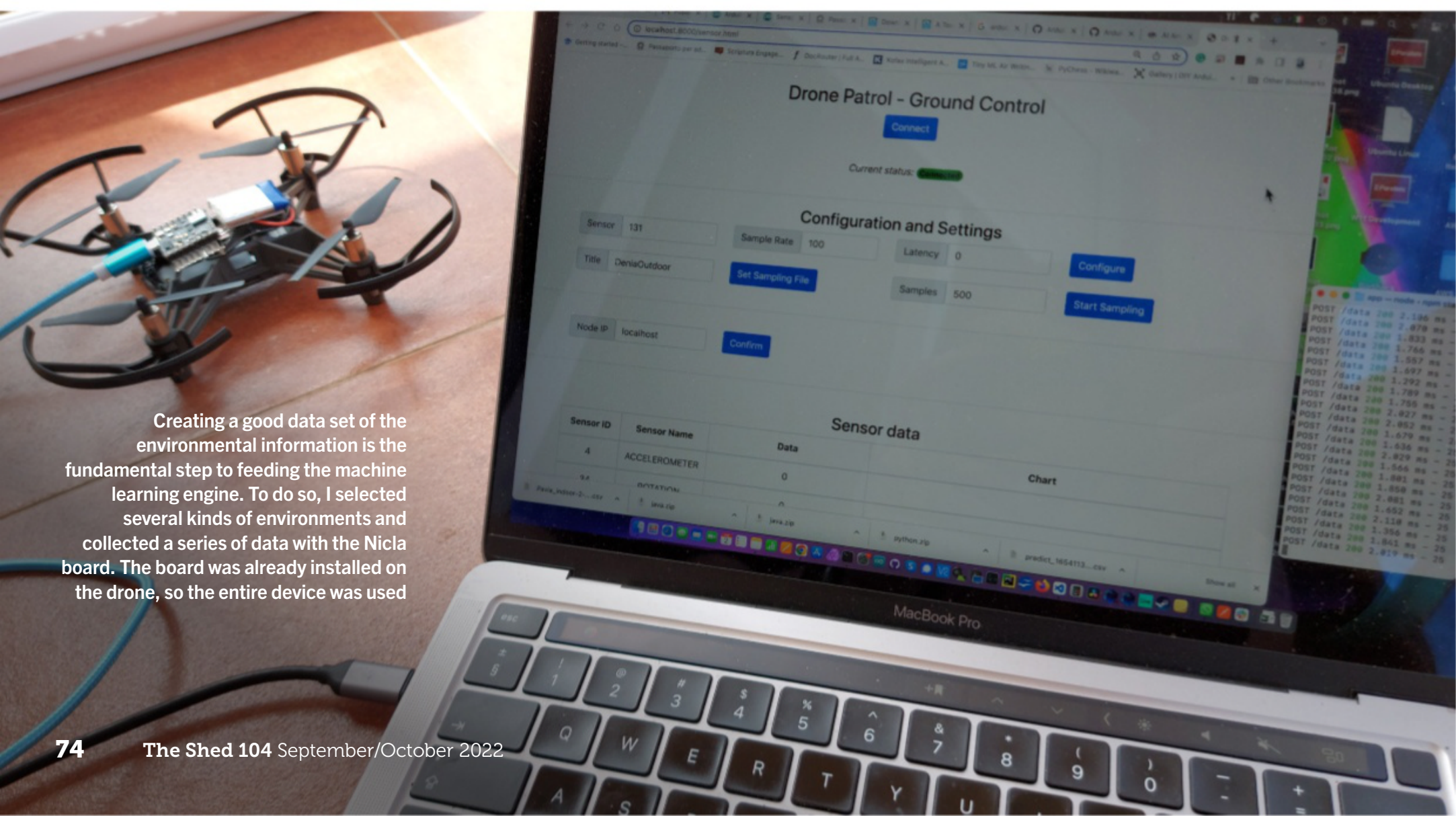
patrol repository (<https://github.com/alicemirror/drone-patrol/tree/master/GroundControl>).

Note that the capability to run a server connected via Bluetooth is exclusively available on Google Chrome. If you try to run the server on another browser, the Bluetooth connection with the Nicla board is impossible.

When the server starts collecting

the sensor data, it generates a CSV (comma-separated-value) text file format for import by the Neuton AI platform.

In the next part (*The Shed* November/December 2022, Issue No. 105), we will see how it is possible to identify the kind of environment based on a few samples through the Neuton AI machine learning engine. 📁



Creating a good data set of the environmental information is the fundamental step to feeding the machine learning engine. To do so, I selected several kinds of environments and collected a series of data with the Nicla board. The board was already installed on the drone, so the entire device was used

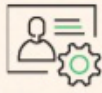
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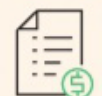
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THE ULTIMATE THERMETTE?

SOMETIMES YOU FIND LOVE IN THE MOST UNEXPECTED PLACES

Words and photographs by Murray Grimwood

A long time ago, watching flames licking up the outside of their cauldron, someone must have wondered if it would be more efficient to have those flames go up the centre. It's easy to see why they'd think like that: no chainsaws, no log splitters, every stick obtained by hand, and the next tree always one tree further away — you'd want it all to count. Thus samovars and, later, Kelly Kettles, Thermettes, wetbacks, and califonts; it has been a long tradition.

Hereabouts, we've been heading in the wood-fired outdoor-cooking direction for a while (see *The Shed* Issue No. 98, page 52) and a pair of Thermettes have played their part; a traditional one and a stainless tank of a thing — which I hid while we went away sailing, forgot where, and lost for a decade, but that's another story.

Then, a couple of months ago, at an auctioneers, I spied what, at first blush, looked like the Wurlitzer of all Thermettes.

Unconditional love

Well, it was and it wasn't. When I got it home (I had to have it; it was unconditional love at first sight) and removed the rodent nest and skeleton from the chimney, the way further down was barred by a horizontal surface. Looking up from underneath, it appeared almost totally baffled — a state I was now in myself; this was no tapered-chimney Thermette.

A search of the make and manufacturer led nowhere — well, to Christchurch; I rest my case! What was this thing? A neighbour, and fellow Thermette enthusiast, was equally bemused but made a suggestion verging on genius: why not look up the patent?



A wood-fired world.
barbecue, baking, and
now a piece of elegant
Kiwiana providing
hot water

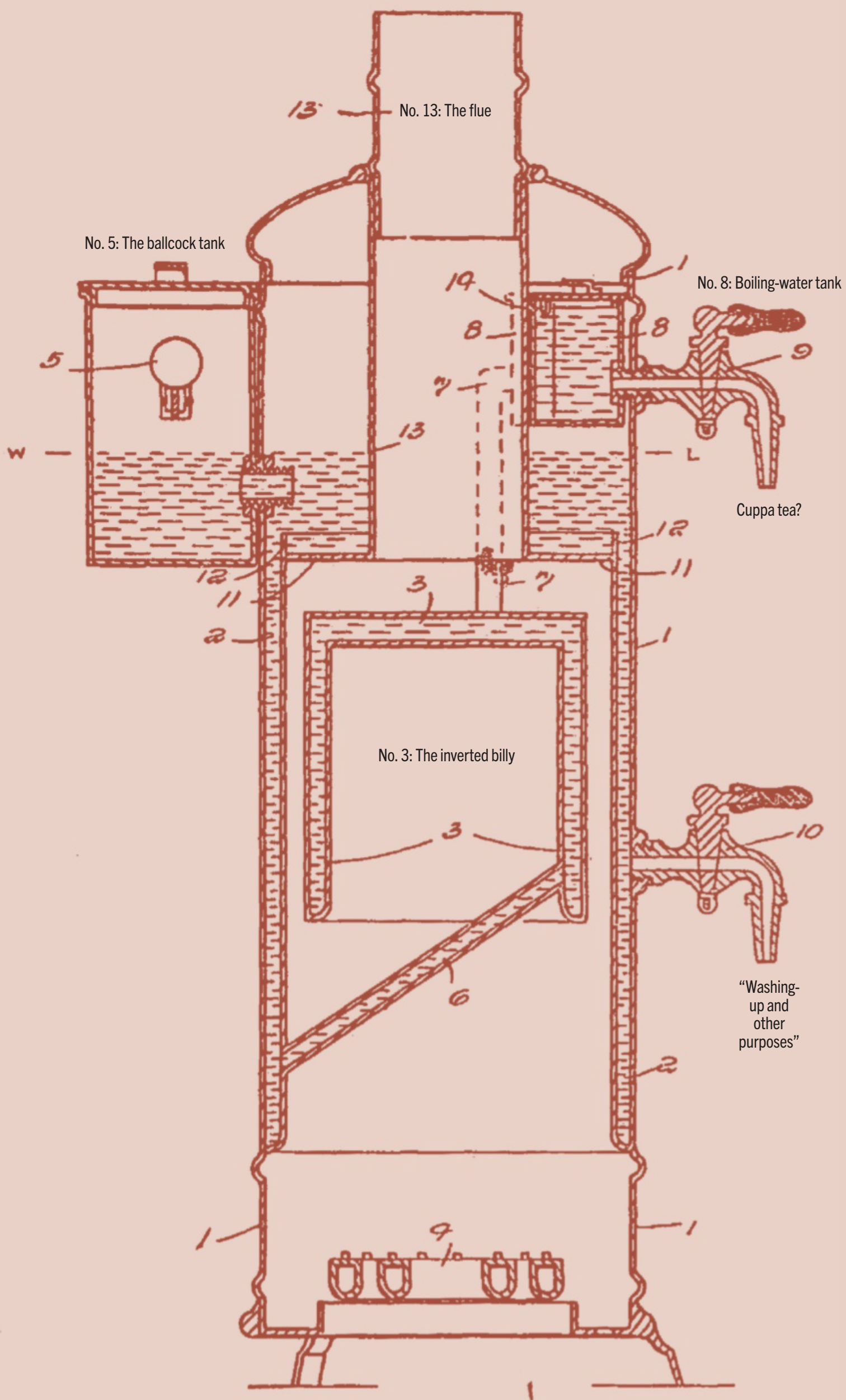


The Wunda Tea Kettle's
new home. I gave it a
partial extension of the
pizza-oven roof

*I spied what, at first
blush, looked like
the Wurlitzer of all
Thermettes*

Bingo! New Zealand Patent
No. 57666, 3 December 1926: “I, Alfred
William Smart, of 80 Richardson St,
Christchurch, in the Dominion of
New Zealand, a British Subject, hereby
declare the nature of this invention
and in what manner the same is to be
performed to be particularly described
and ascertained in and by the following
statement” — clearly, charging for
legalese is nothing new. ►







The cocoa meter as it came home. I later used the rusty collar to direct heat into the central billy



Bush fitting (well, there's bush carpentry, isn't there?)



Tapered taps were mated pairs and only needed a little lapping

Smart cookies

Enthused, I took the thing — which I now knew to be a gas geyser — over to a mate who once designed cookers and ovens for Fisher & Paykel. We laid it sideways on his living-room floor, mopped up the resulting water — we're smart, but not that smart — printed off the patent and settled down to peruse it over coffee. We found out that it had been “intended ... for use in tea rooms and other places” to “supply boiling water for tea-making and the like ... and supply below boiling point as required for washing-up and other purposes”.

The printed-out plan, 96 years old but almost exactly delineating the monster lying at our feet, explained it all.

The printed-out plan, 96 years old but almost exactly delineating the monster lying at our feet, explained it all



Now it gets harder — what to do with the rest?

Claim to fame

The tank at the back is a ballcock-controlled reservoir. Water flows from that to a circular chamber, then down the double-skinned wall of the unit, being partially heated en route. It is this water that the bottom tap disgorges for “washing-up and other purposes”. The flow is thence upwards via two angled pipes to an upside-down, double-skinned ‘billy’ directly above the gas burner — one hopes that those tearooms flued their Wunda Tea Kettles to the outside world; that inverted-billy chamber

has to be a recipe for some interesting fumery. Getting hotter in the billy, water climbed to a higher tank, at a level above the ballcock only attainable by boiling. This fed the upper “tea-making and the like” tap. That upper tank had overflow vents — for obvious reasons — that fed back to the ballcock level. Clever and elegant, although perhaps complicated to assemble, its legitimate claim to fame is the split-temperature feature.

Not the first

The feeling of respect for long-dead thinkers (which I've held since an awed adolescent encounter with an 1896-designed Turner Pinwheel — a ►



Test firing day — looking satisfyingly ‘of a piece’



Looking down into the ballcock tank before cleaning — simple and compact



Looks like it's gonna work! Note bent hinge as handle

mechanical area measurer for leather), cast a pleasant aura over the morning.

A bit of research corrected at least one misconception that I'd been harbouring: the Thermette wasn't the first such design, and realising this induced a little cranial appraisal of such things. So much isn't actually the origin of something; more likely, a design will be an attempt at improvement on what went before, and a stab at what comes next. With hindsight, we know which were the blind alleys and which were the valid pathways; wing flappers never flew, any more than did steam cars or the Baird version of television. However, they all had to be tried or we'd never

have known; we'd never have got to where we have. I regard our stepping away from fossil fuels — or them from us; same thing — as a similar peering ahead; “through a glass, darkly” comes to mind.

Hot water: a short history

Gas geysers were nearly 40 years old in 1926 — search: ‘Ruud gas geyser’. We have to remember that only major cities had reticulated gas, and that much of 1926 New Zealand had yet to be electrified. Nobody back then had a clear idea about which way hot water would go. A contemporary advertisement from the

same firm shows a young robe-clad lady anticipating a hot bath, courtesy of something very similar to the Wunda. Yet, according to the Building Research Association of New Zealand, even by 1945 only three-quarters of New Zealand households had hot water.

We know now that by 1960 hot water was supplied by coal range / wetback, electrically, or via spiral-coil gas califonts, such as the old Ascot I grew up with. Likewise, from 1960 onwards the ubiquitous Zip monopolised the tea-room market, not to mention being proudly mounted above hundreds of community-hall sinks. So, my guess is that our inverted-billy Wunda Tea Kettle has spent several decades in decommissioned retirement — perhaps even longer than this pensioner has been alive!

Even by 1945 only three-quarters of New Zealand households had hot water

The Benghazi boiler



The Thermette was patented by Auckland electrical engineer John Hart in 1929 and first sold in 1931. When World War II broke out, the New Zealand Army asked him to waive the patent. He agreed, and the device became known to soldiers as the 'Benghazi boiler'. Others quickly learned that the burnt circles meant that the Kiwis had been there.

Thermettes are similar to 'volcano kettles', made by Irish gypsy tinsmiths since the mid 19th century. According to Wikipedia:

"There was a meeting between one of the [Irish] Marris family and a New Zealander (almost certainly John Ashley Hart ...) to discuss products and ideas. The original concept of the volcano kettle appears to have been Harts [sic] ... The first Sirram [Marris spelt backwards] Volcano Kettle was manufactured out of spun copper with brass handles/fittings, it appeared in the late 1920s and was eventually covered by Registered Design No. 731794 of 1928."



1926 advertisement, courtesy of the National Library of New Zealand

Restoration and adaption

Clearly, this thing was worthy of respect, refurbishment, and reuse — definitely reuse. A realistic target would be having it still bubbling away as it turns 100, in 2026. However, our whole pathway hereabouts has been away from fossil energy; surely, if it could handle gas, we could wood-fire it? That meant a firebox. As usual, I tried to scrounge from my own resource library first, and came up

with the bottom of an old pot belly. It was a good start but not tall enough — not anything enough, really. Off to Rietveld's then, critically appraising likely items until I was down to either a square-into-round stainless fabrication or an 'I don't know what it is but it looks adaptable' piece of machinery. Turns out the latter was a cocoa meter/dispenser from Cadbury's, but if I stripped it down and turned it on its side ...

A perfect fit

As luck would have it, a quick skiff with the grinder and it dropped straight into the pot-belly base. I took some time cutting off superfluous flanging, and notching the front one to ensure a positive location. An old bit of grating — from a destructor, maybe? — chopped down to fit; a casting from an old log burner trimmed down as the door, and the thing was almost done. My hinge collection has been well ►





I cut the stainless bench to parallel the pizza oven



Plinth under construction — bricks, a cool store—panel off-cut, some mesh, and we're ready to plaster

ratted; the only thing left that might work was one of those tapered gate hinges, but it was far too long. The door would also need opening, though; let's hook the tail of the gate hinge and kill two birds with one stone. It's not often that you can marry such disparate items to the point at which an unknowing punter might assume they're one original unit; it was good fun.

Efficient as

The test firing out on the lawn suggested that one shouldn't be too hasty in discounting technologies — I'd assumed

the inverted billy would be inferior to a spiral coil. The Wunda, which at six litres is three times the volume of our smallest Thermette, had boiling water sputtering into the upper tank in a very few minutes; same time, same fuel miserliness. It may be less portable; it sure as heck isn't less efficient.

The top tap was loose, and it looked as if there must be a loose nut inside the top tank. To get at it, I carved a hole in its upper skin — above the vents, so no leak issues — which I'll screw a patch over. Turns out the loose — and only — nut is the one on the

outside, which needs to be re-secured to the tank face. There's another loose nut, come to think of it: the one who carved that unnecessary hole!

Plinth charming

Of course, it needed all the peripheral stuff too: a brick-and-cement plinth (complete with puns: 'someday my plinth will come'; 'plinth charming'; 'who plinthed my ...' enough!); a water feed; and, while I was at it, a cut-down sink bench for whoever is on "washing-up and other purposes" duty.

I tried polishing the Wunda, but it was a mistake; nearly 100-year-old chrome over copper over brass is a tad fragile and best left as is. Patina, when all is said and done, is its own entirely valid story.

I made a stainless cover for the back tank (either the original got misplaced or it never had one), gave it a flue, gave it a bit of shelter by extending the pizza-oven roof, and that's enough; an extremely cool piece of Kiwiana has found a new home.

NB: If anyone knows about Mercers or Mr Smart, or can add information about the Wunda Tea Kettle, please write via the magazine; I'm keen to know as much of their backstory as possible. 📖



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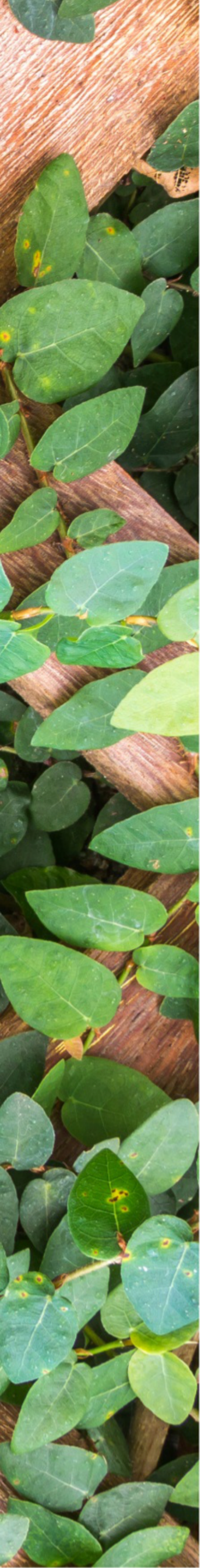
MITRE 10

WITH YOU ALL THE WAY

CONFESSIONS OF A CHEAPSKATE

Economy, creativity, and achievement — there's very little to equal the satisfaction of 'do it yourself'

By Andrew Broxholme
Photographs: Andrew Broxholme



Wind break for newly planted hedging

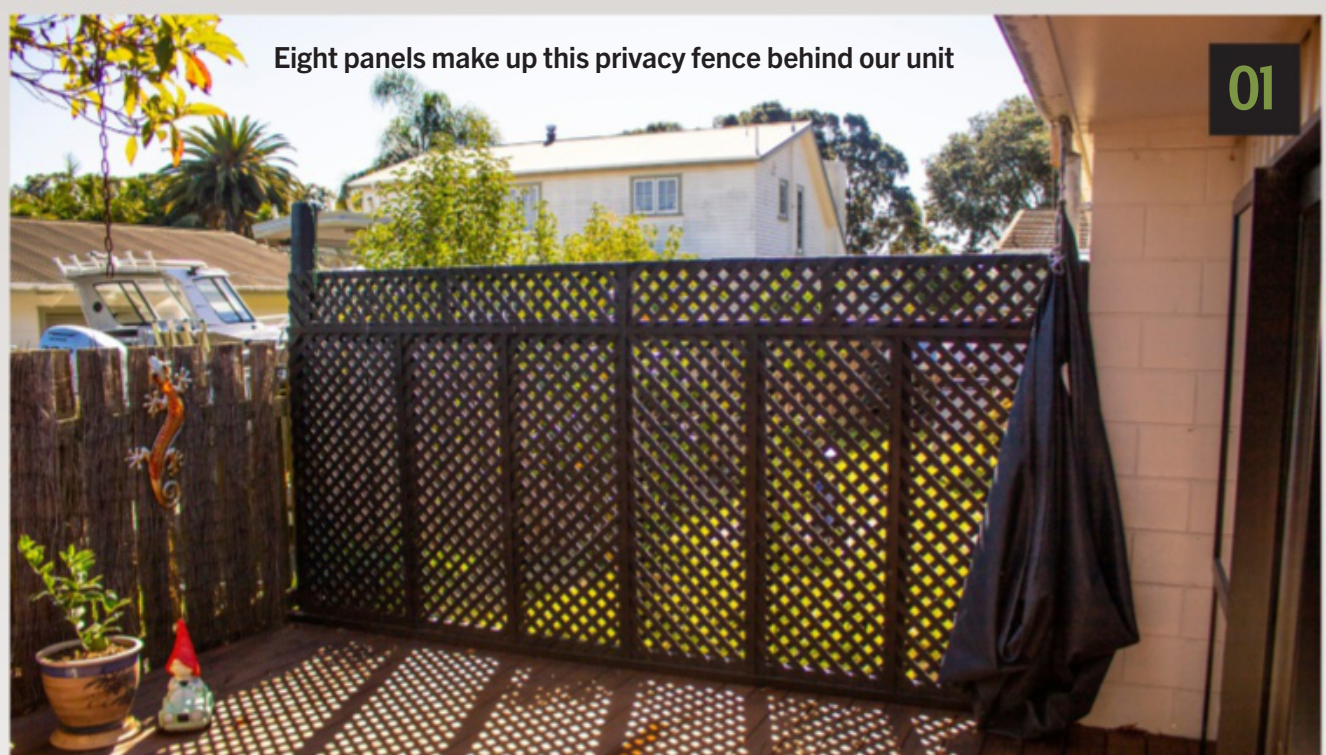
Trellis or lattice panels are often made to support climbing plants — the idea dates back hundreds of years. They were some of the first things I remember my dad making when I was growing up. If you have the equipment to make them — more on that later — then they are also very inexpensive, especially if, like me, you like to make them from what is in effect scrap wood.

You can buy pre-made trellis screens at Mitre 10 or Bunnings but I won't pay that much for something I can make for a fraction of the cost. The other problem with commercial products is they typically come in only a few standard sizes which can't be modified easily. I can make panels whatever size I need. As an example (see below for the unit), here is a unit I finished a year or so ago. It does a good job of hiding the gas bottles for the hot water system; it also protects the bottles from vehicles driving in and out. The front is a two-piece door — I did intend to build a top but that hasn't happened yet.

Minimal materials

What do you need to make something like that? The materials are minimal: some framing, which I usually make from about 20mm square stock, often cut down from offcuts of thick decking, and lots of strips of wood, again cut down from shorter lengths of leftover wood.

The strips can be any thickness but at least 5–6mm is best if you want them to have any strength. I often cut up decking board offcuts; these are usually at least 12mm thick, so that is their finished width. If you want to make something big, then wider, thicker strips will mean a lot less to cut up and assemble. Most of my trellis panels are either for privacy or to act as a windbreak. In both cases, it's best to use thinner strips spaced about the same distance apart as the width of the strips. ►



Eight panels make up this privacy fence behind our unit

01



The privacy fence up close.
The wide strips cover the joins
between panels

Trellis is a versatile option

This fence **[photo 1]** made from trellis panels is at the back of our unit. It consists of eight individual panels. There was previously a low concrete block wall that wasn't very stable. The problem I had was a very thick concrete base with no easy way to fit posts midway across to hold up the new fence. We found that our deck area was a bit of a wind tunnel, so any sort of solid fence would need posts to keep it up. Wind, though, simply goes through trellis so it was a good solution, and the close spacing of the strips makes it quite private unless you are very close to the

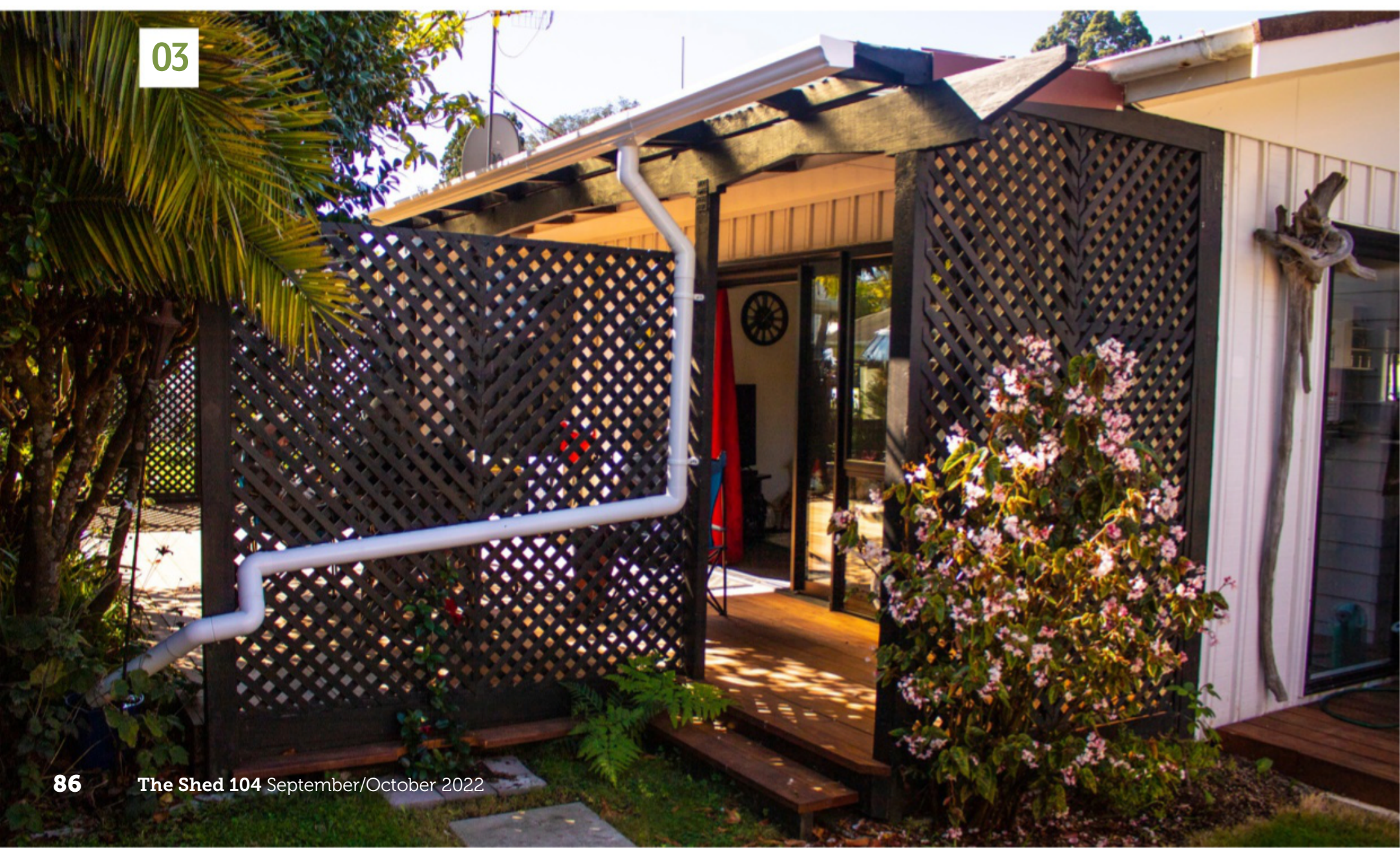
fence. I made the six lower panels in pairs; their size meant I could simply lay the frames down on the deck to line everything up. A few strips were left off so the panels could be fitted in place and screwed and bolted to each other once painted.

Nice touches

The close-up image **[photo 2]** shows the wider strips fitted across the joints between the panels, which was a nice finishing touch. A thick piece of wood runs across the top of the six panels to add rigidity. If I were to build it again, I might use a metal plate. I also considered adding a metal reinforcing strap across the top, painted black, but it has held up to some fairly strong winds in the past year so it probably isn't really necessary.

I built similar panels to close in the other end of the deck **[photo 3]**, which makes it very private and quite sheltered. We have planted a climbing vine to grow over that downpipe, which carries away water from the small roof area and pipes it into the little garden. Both large panels were made in two sections joined together once painted, then touched up as necessary.

I made this trellis for
privacy on our deck

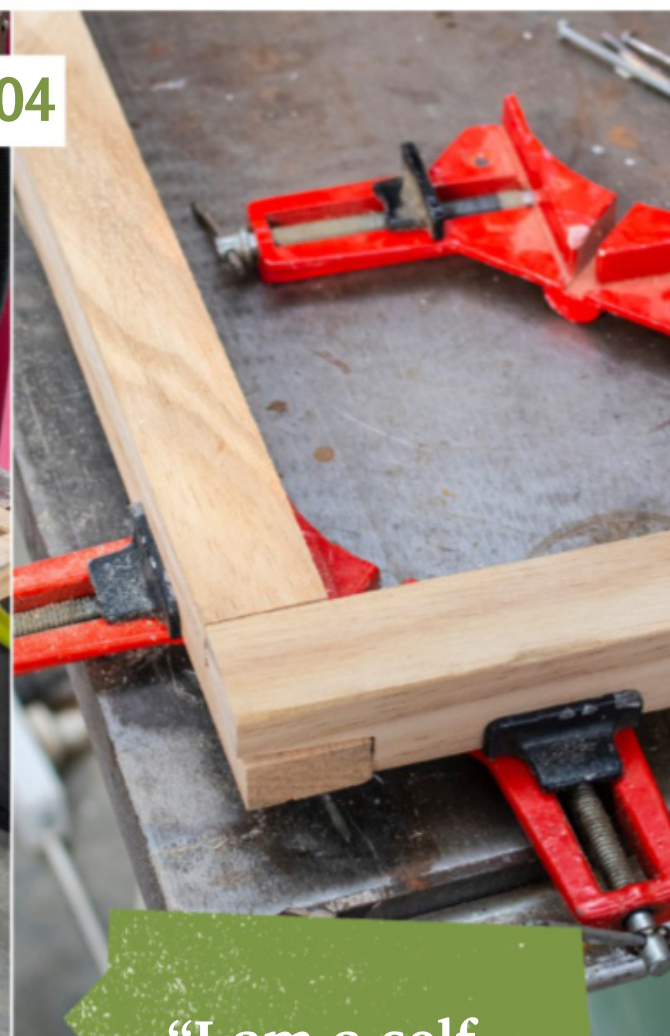




Hides and protects the gas hot water bottles



Using corner clamps to hold the frames square while the glue dries



Making the trellis panels

I first cut the frame sections by ripping short lengths of thicker timber offcuts lengthwise — in this case, into four equal widths so I waste nothing in effect. I am a self-confessed cheapskate and hate wasting wood; it's expensive, so very little is thrown away. I have lots of small pieces of wood, so it's great when I can use up some of those shorter lengths for projects. You don't even have to use new timber — I've taken pieces that have sat outside for a year or so, stored them inside to dry, run a belt

sander over them, then cut them up and made trellis from them, with the only waste being sawdust. Realistically, you need to use treated timber for outdoor trellis but you can use untreated timber if you paint it.

My simple frame just uses lap joints for the corners; they are easy to make and more than strong enough when glued and screwed — even more so when the trellis strips are glued and nailed in place. The image **[photo 4]** shows how I use corner clamps to hold the frames square while the glue dries. ►

“I am a self-confessed cheapskate and hate wasting wood; it's expensive, so very little is thrown away”



05

Lap joints being cut on my table saw sled

“The closer the slots, the easier they break off — use your fingers or a few light taps with a small hammer before using a chisel to finish off”

Framing

You can cut the joints by hand, but if I am making multiple frames I use my table saw to cut them all in one run. Take an offcut of the framing you are using and create a pattern **[photo 5]**. Then, in pairs, cut the joints as a series of slots, which are easy to clean out. The closer the slots, the easier they break off — use your fingers or a few

light taps with a small hammer before using a chisel to finish off. The result is all your framing ready to assemble **[photo 6]**. Now, back to the frames: if you're making a series and they need to be the same size, then build them on top of each other — builders do this when making framing for houses. Carefully set out and measure the bottom one, then build all the others on top) **[photo 7]**.



06

Cut the joints as a series of slots, which are then easy to clean out

07

Carefully set out and measure the bottom frame, then build all the others on top



To treat or not to treat

Treated vs untreated timber, paint vs stain? It's really over to you, except that untreated timber, like pine, won't last long outside — a couple of years and it will rot away. Treated timber will last longer, but if it's in contact with the soil then it will still rot. I usually paint or stain my panels so they are an even colour, and I don't skimp on paint/stain. While panels are not hard to make, if you maintain them they will last a long time.

09

My latest cheapskate trick is to use a worn-out belt from my sander

Assembly

Here are the cut trellis strips **[photo 8]** ready to be assembled. These are wider than I usually use, but I have a whole lot of thick decking offcuts and this is a good use for those between 80cm and 120cm long.

Once cut, they need a quick sand to take off the furry edges left by the sawing process. My latest cheapskate trick is to use a worn-out belt from my sander — one happened to be lying around one day and, when I couldn't locate my hand sander **[photo 9]**, I found it worked well. (I also have trouble locating tape measures; gremlins hide them when I put them down in my messy workshop.)

My latest tool **[photo 10]** is a speed square. It is actually the best \$15 I have spent recently; it's a nice solid tool that makes positioning the first strip very easy. I put a little glue under it, then a single nail in one end position, and fasten the other end. I like to start at a corner and this is how you measure the maximum length you will need. I cut the strips in batches, so this tells you which offcuts are long enough for the panel you're making. ►

08

Cut trellis strips ready to be assembled

10

Most of my trellis is made by hand with a hammer and small nails, the nailer is quicker but not necessary



A short offcut from a strip makes a great spacer

11



12

Keep adding strips and working towards a corner

Fitting the strips

I typically space my strips the same width apart as the strips themselves, so a short offcut from a strip makes a great spacer. This one **[photo 11]** is a bit shorter than ideal but still did the job. Keep adding strips **[photo 12]**, working towards a corner — don't worry about the overhanging strips. These are cut off **[photo 13]** using the edge of the frame as a guide

a guide — I use a small tenon saw. The offcuts are then used for the shorter lengths nearer the corners — not much is wasted **[photo 14]**. Here **[photo 15]**, two panels are ready for final clean-up. My battery-powered circular saw is good for this job; it's a whole lot easier than a handsaw — although by hand you can be very precise, and not have much sanding to do afterwards.



13

Note the overhanging strips. These are cut off using the edge of the frame as a guide



14

The offcuts are then used for the shorter lengths nearer the corners

15

Two panels are ready for final clean-up



The finish

After trimming and sanding, these panels were finished. I decided on single-sided panels, as they are only for an outdoor garden bench. They add some decoration while preventing the wind from blowing empty pots off the lower shelf **[photo 16]**.

Here is the best part — the waste that is left over, which even I'm happy to throw in the bin **[photo 17]**. ►

Here is the best part — the waste that is left over

17



16

Potting bench made from a pallet and some old framing timber. It's amazing what a coat of stain will hide





18

My latest project is a windbreak, to protect some newly planted red robin hedging

Make sure the pre-painted strips face down; it's a real pain if you put one the wrong way — ask me how I know that!

Windbreak

My latest project **[photo 18]** is a windbreak, to protect some newly planted red robin hedging. It can get very windy at our lifestyle block, so these panels are both decorative and functional. These were always going to be stained, and I'm putting the opposing side strips on the other side of the panel. The inside of the panels and one side

of the strips need to be stained before installation **[photo 19]**.

The first few strips of the second side being fitted — note the speed square to help align the strips **[photo 20]**. It's important to make sure the pre-painted strips face down; it's a real pain if you put one the wrong way — ask me how I know that!

The first two panels just before the final trim and clean-up **[photo 21]**. ►



19

The panels and one side of the strips waiting to be stained before installation



20

Make sure the
pre-painted strips
face down



21

Two panels just
prior to the final
trim and clean-up



22

Here are my finished panels installed in the garden protecting some small trees

“I started off small, experimented with what was in effect scrap timber, and can now make panels like these in a couple of hours”

I like to leave them for a few hours for the glue to dry.

Here they are installed in the garden **[photo 22]**. I have a fourth panel made up, which will go in when we extend the garden and plant a few more red robins. The panels are mounted on treated timber posts, which were given a coat of the same stain to match the panels.

Larger panels?

If you want to have the strips perfectly aligned on adjacent panels then you could make the double panel in one section, which I often do, but larger panels take up more space when they are being worked on and are awkward to move around. You can alternatively put the adjacent panels next to each other when you are starting and place a long strip that goes across both. Glue and nail it in place, then, when the glue

is dry, cut the strip between the panels and build out from that on both panels.

My preference is to make smaller sub-assemblies and work on them individually, fitting together completed ones. You might get an idea for a change, which you can then apply to the last panels, or you might make a mistake in measuring the space and need to make the last few panels slightly larger — as happened with the big fence at my unit. The last two big panels were 2cm wider to close a gap that shouldn't have been there, but you really cannot tell.

Practice makes perfect

I don't consider myself a craftsman; these panels are not perfect, but they are good enough. They are, after all, outside structures, look pretty good from any distance, and are not hard to make. Like anything, practice makes perfect.

I started off small, experimented with what was in effect scrap timber, and can now make panels like these in a couple of hours. The total cost, given I was using offcuts, was probably under \$10 for glue, screws, nails, and even the paint.

It's also very satisfying to make things around your home, and to be able to say to friends who ask where you got something that you made it yourself.

The final thing is that mistakes are OK. I've made plenty, and you just learn from them. The old saying: 'Measure twice cut once' is very true in woodworking, but there have been plenty of times when I've measured twice, cut the piece wrong, and it's ended up in the scrap bin with a few %\$#&^@#\$ words to accompany it. You will also hammer your fingers and cut yourself — it's all part of the fun.

There is also some truth in those ads where you can ask for help at the DIY stores. The older staff often have loads of experience and are happy to share it if you ask. There are also lots of groups on social media where you can get ideas and help. So, why not give woodworking a go, or try making something you have never made before? 🛠️



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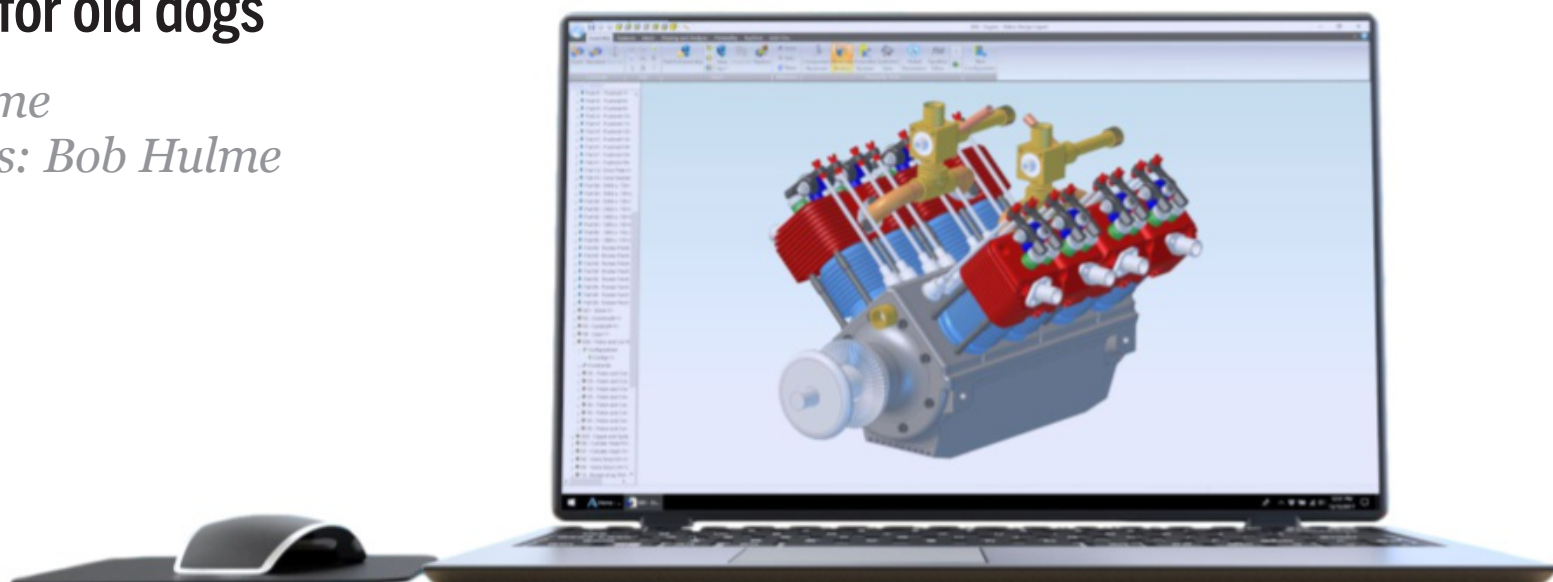
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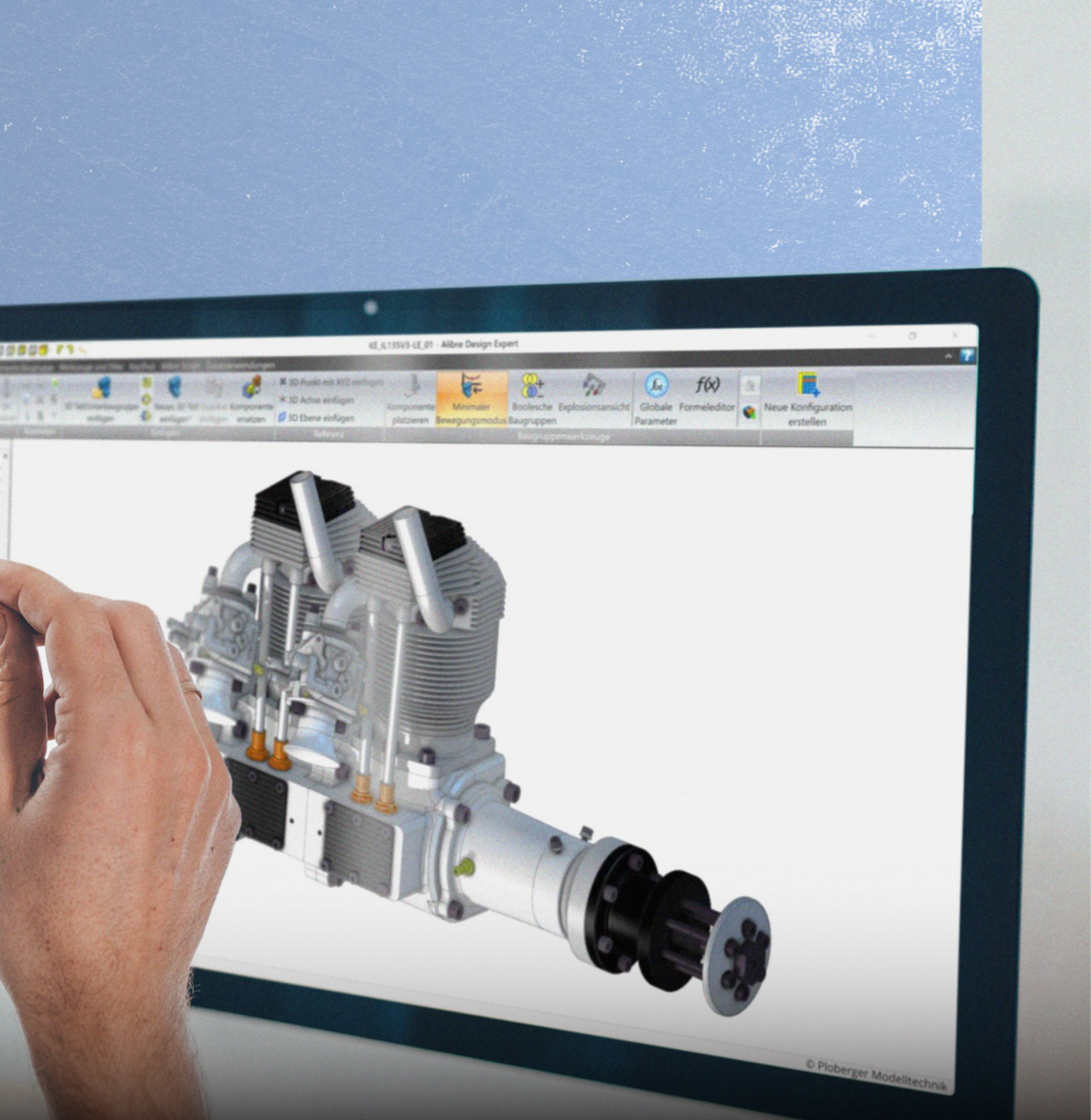
PART 1

New tricks for old dogs

By Bob Hulme

Photographs: Bob Hulme





can see that you have your hand up already with the first question.

“Why do I need to learn this?”

I suppose that you don’t need to learn this stuff, but it is so much fun — why wouldn’t you want to learn how to do it?

In today’s environment, where digitally controlled equipment is now common, businesses that provide services such as cutting, folding, and machining are receiving digital drawings rather than the printed drawings that were still the norm until a couple of years ago.

If you need to make a metal bracket, for example, it is quite cost effective to have it either laser or plasma-cut then folded by a supplier with computer numeric controlled (CNC) equipment, even if you only want a one-off. It will come out spot on.

“If you cannot provide a digital drawing, the cost increases”

Providing a drawing

If you cannot provide a digital drawing, the cost increases because the supplier needs to make a digital drawing from your sketch or printed drawing. It’s the same for getting parts machined, but there are still engineering shops around with manual machinery that can work from a regular drawing. As more years pass, there will be fewer tradespeople around who are content to use manual machine tools, so CNC machines will become the backbone of industry. ►

3D printers are becoming more affordable and the quality is improving. To design an item for 3D printing, you will have to put away the pencil and paper and make a digital drawing. Apart from sheddies equipping themselves with 3D printers, there are some adventurous types building their own CNC routers. I can imagine that being a great MenzShed group project.

Multiple drawings for parts

Another use for this technology is to make sure the parts you have designed fit together properly and move without fouling when assembled. Yes, that is right: you can design separate parts of a machine. Then, using a digital 3D drawing program, you can put the individual parts together and get the machine to go through its movements to check that it all works as intended. There is a saving in wasted time and material when a problem is picked up in the design stage like this. This simulation can also serve as a demonstration tool.

Software

The program (software) I am using is Alibre Atom 3D. This is ideal for home use because it is low cost and you pay only once and that copy is all yours. There are other programs where an annual licence fee is charged, but those are more suited to businesses that have staff using the programs full time. Alibre is an easy-to-use program,

“To design an item for 3D printing, you will have to put away the pencil and paper and make a digital drawing”

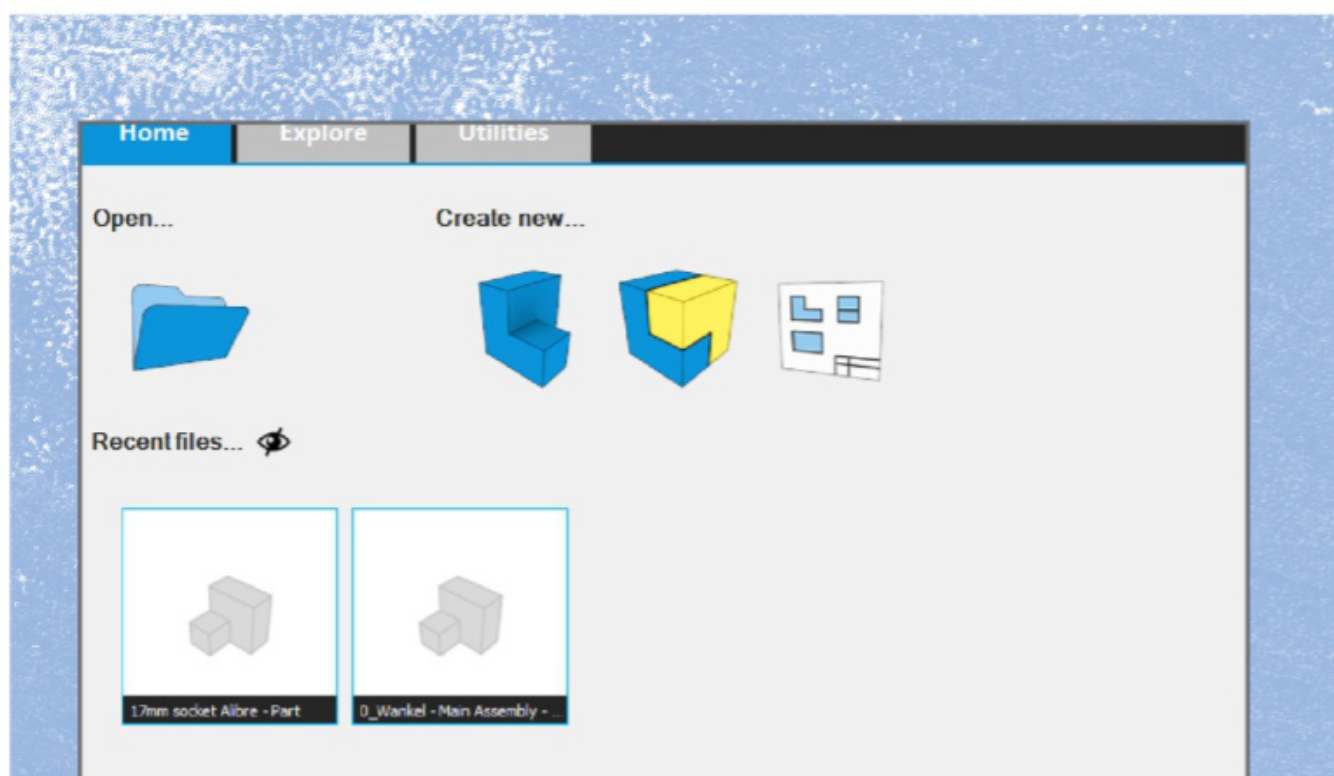


Figure 1: The Home Page

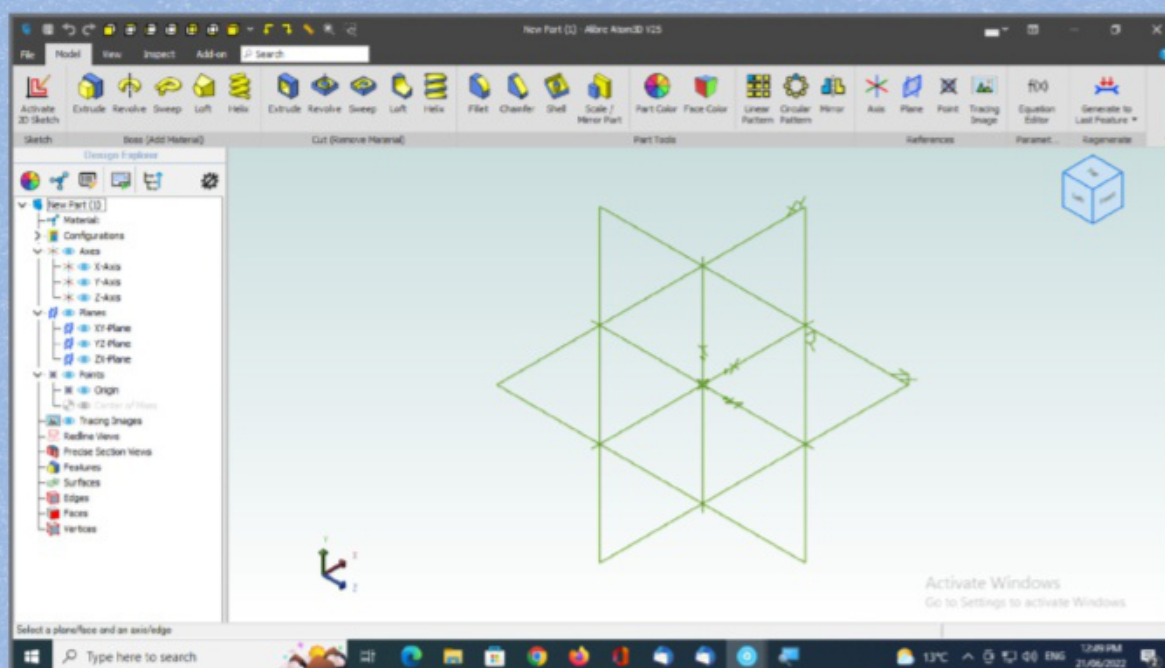


Figure 2: Selecting a Plane to Sketch on

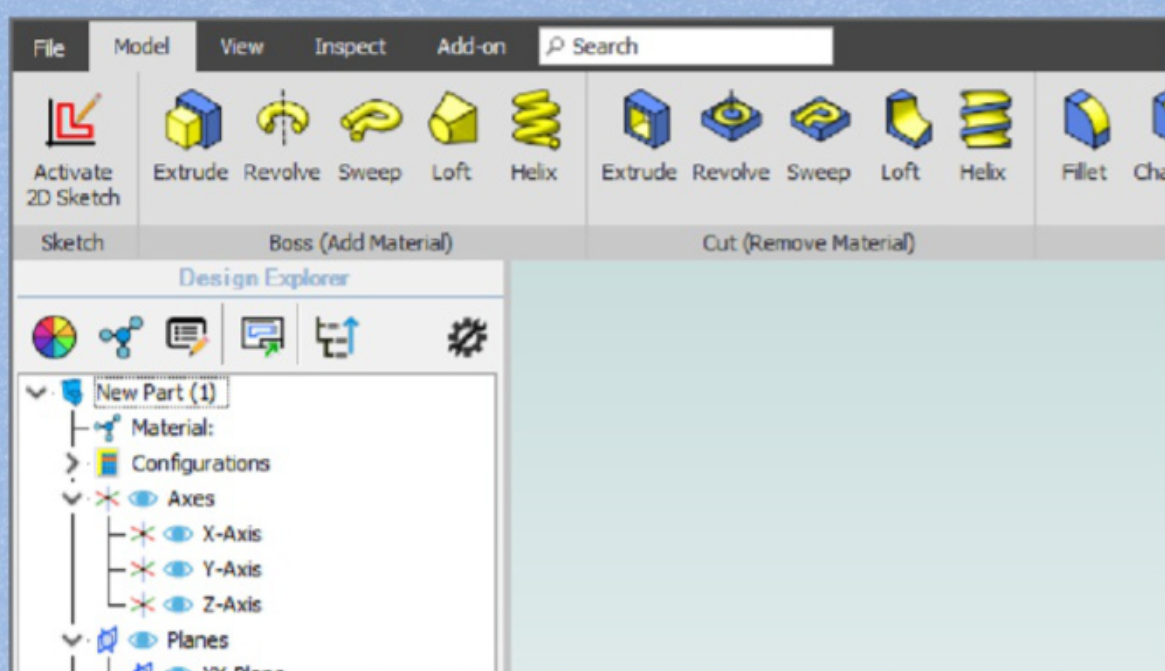


Figure 3: Activate Sketch function

and that's important when you only use it from time to time rather than for 40 hours a week. Remembering all the functions and operations isn't such a problem with this user-friendly program. It is comparatively straightforward to use.

Jumping right in

This is the best way to learn this stuff. Let's jump right in and draw our first item. I will explain as we go along what we are doing and also introduce some of the terms that are used — and in fact that are common to most 3D drawing

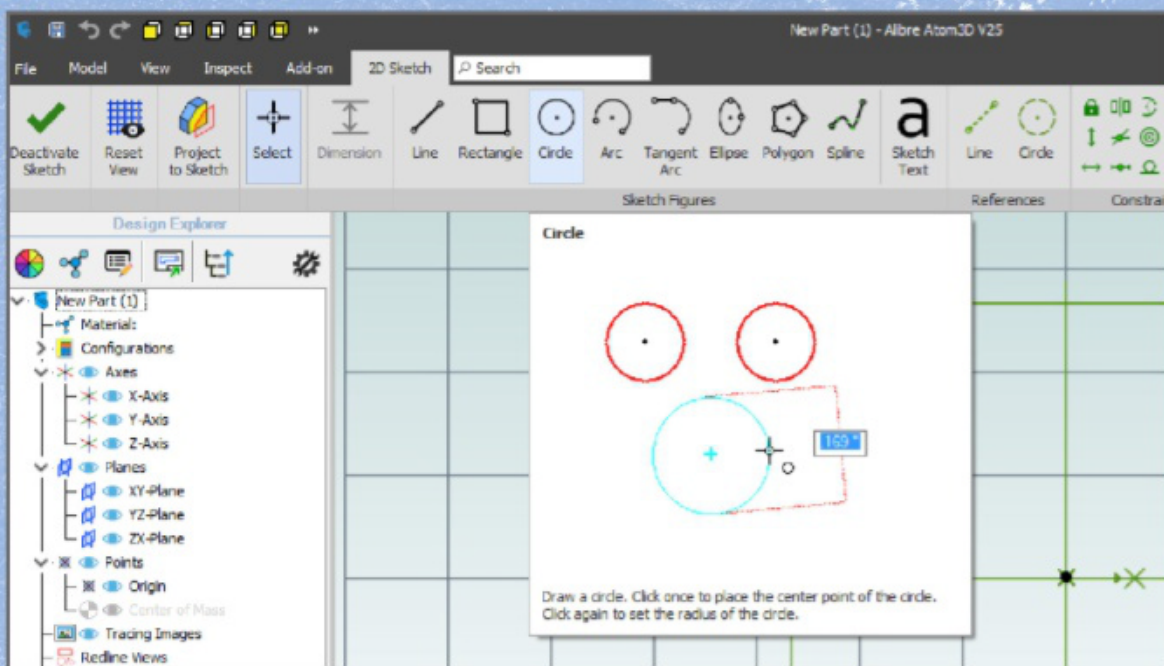


Figure 4: The tools explain themselves

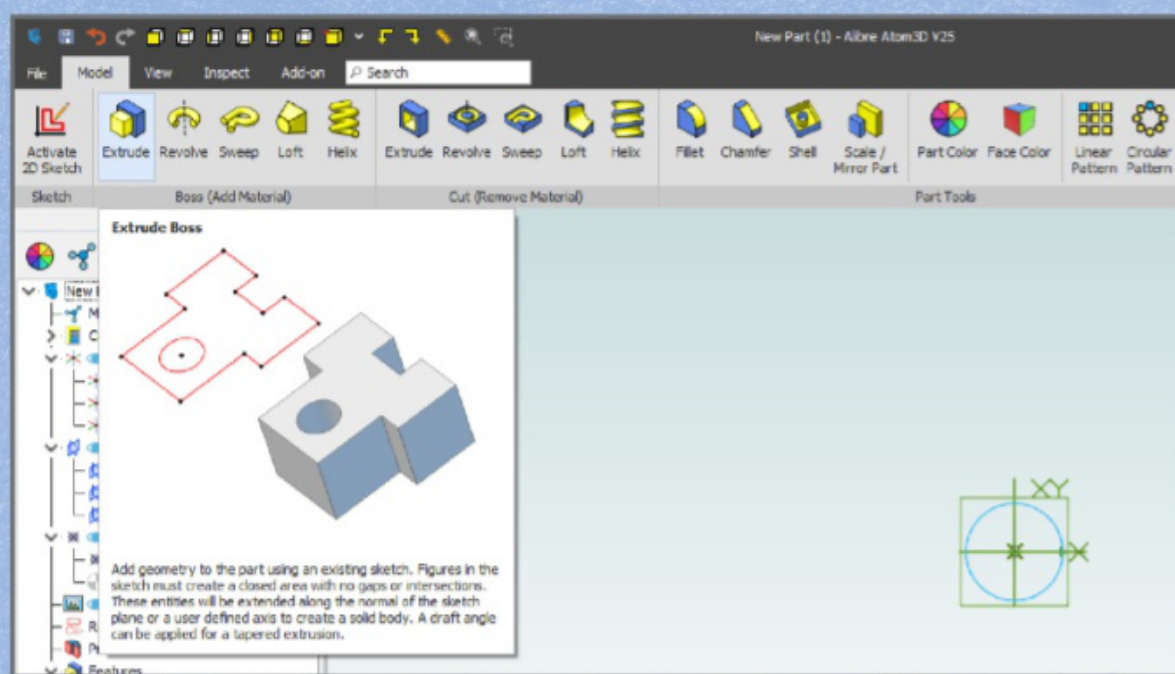


Figure 5: The Extrude (add material) tool

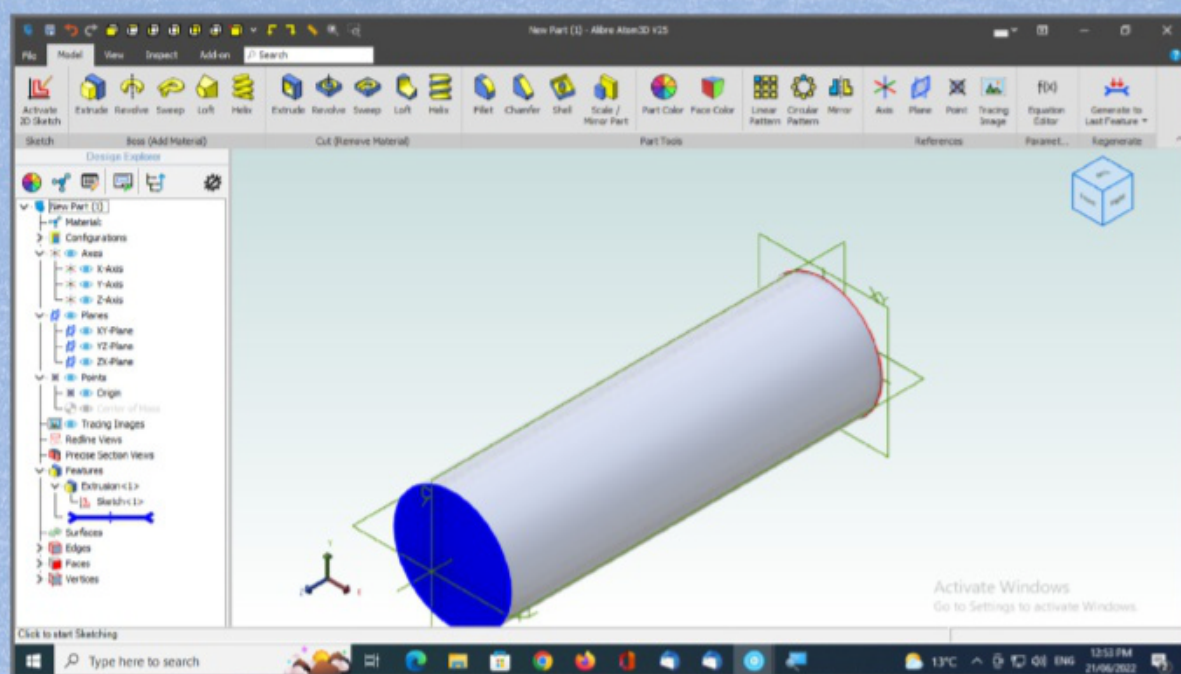


Figure 6: Selected face turns blue

programs. We will be drawing a 17mm A/F, ½-inch drive deep socket.

Starting off

Start the program, and the home page shown in fig. 1 will appear on screen. By running the cursor over the icons on the

screen you will see a text appears that says what they do. The one we want is 'Create new parts'. Click on that icon with the left mouse button and you will then see the screen as shown in fig. 2. (When asked to 'click' anything, always use the left mouse button unless told otherwise.)

We are going to select a plane that will be the end view of our socket and then draw, in 2D, the shape of its body — in this case circular. This is called a 'sketch' in digital drawing speak. Then we will extrude that circular profile to make a solid cylinder. 'Extrude' is the next digital drawing speak term.

The idea here is to create a solid piece of material and then cut the holes out of it — in the same way you would machine a solid piece of steel when physically making something like this. That is the overall principle of how to approach the task of making a 3D digital drawing.

“When asked to ‘click’ anything, always use the left mouse button unless told otherwise”

Sketching

You will see a strip across the screen (ribbon) very near to the top, with lots of icons in it. This is your toolbar.

If you move the cursor to any of those icons a description of what that tool can do appears. At the far left-hand end of the toolbar is an icon labelled, 'Activate 2D sketch'. Click on this (fig. 3).

You will be asked to select a plane when you move the cursor back into the workspace area of the screen. Select the XY plane by placing the cursor on it — it will turn blue — then click on it.

We will make a simple sketch to allow us to form a cylindrical piece of material from which to make our socket. First, you need to draw a circle. Click on the 'Circle tool' icon in the toolbar (fig. 4) then move the cursor into the workspace area. Hover the cursor over the 'origin' point, which is the centre of the plane. When the origin point turns blue, click it with the left mouse button. This establishes the centre of the circle.

Move the cursor away from the origin and it will draw a circle. The further out you move the cursor, the bigger the circle. Click again when you have a circle that ►

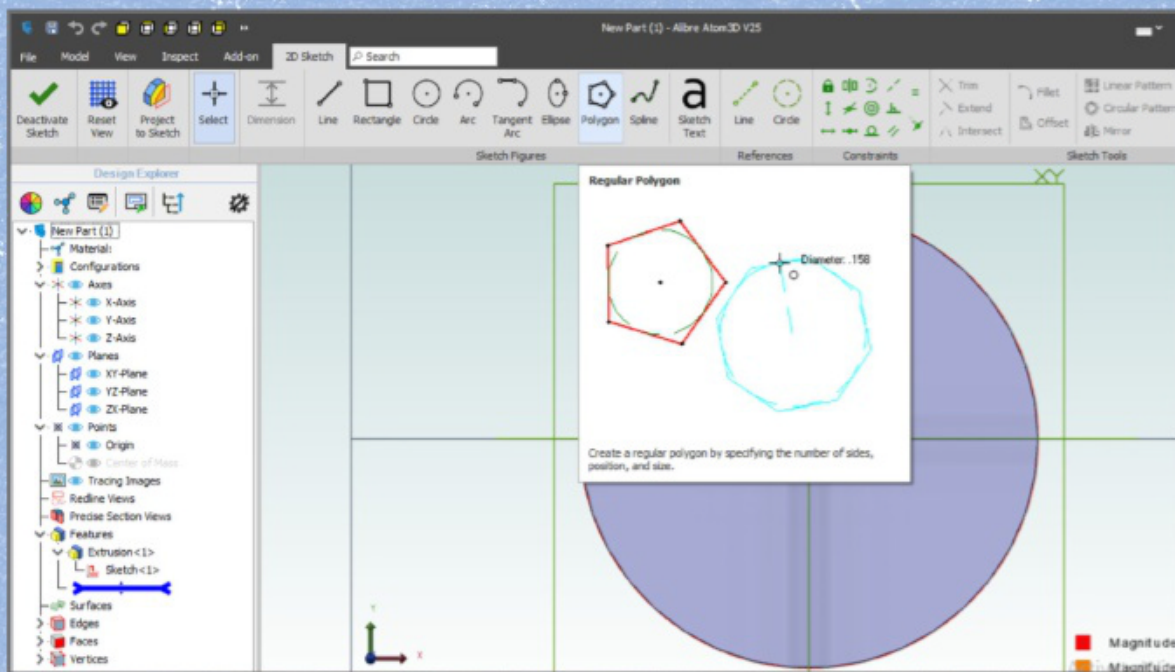


Figure 7: The Polygon tool

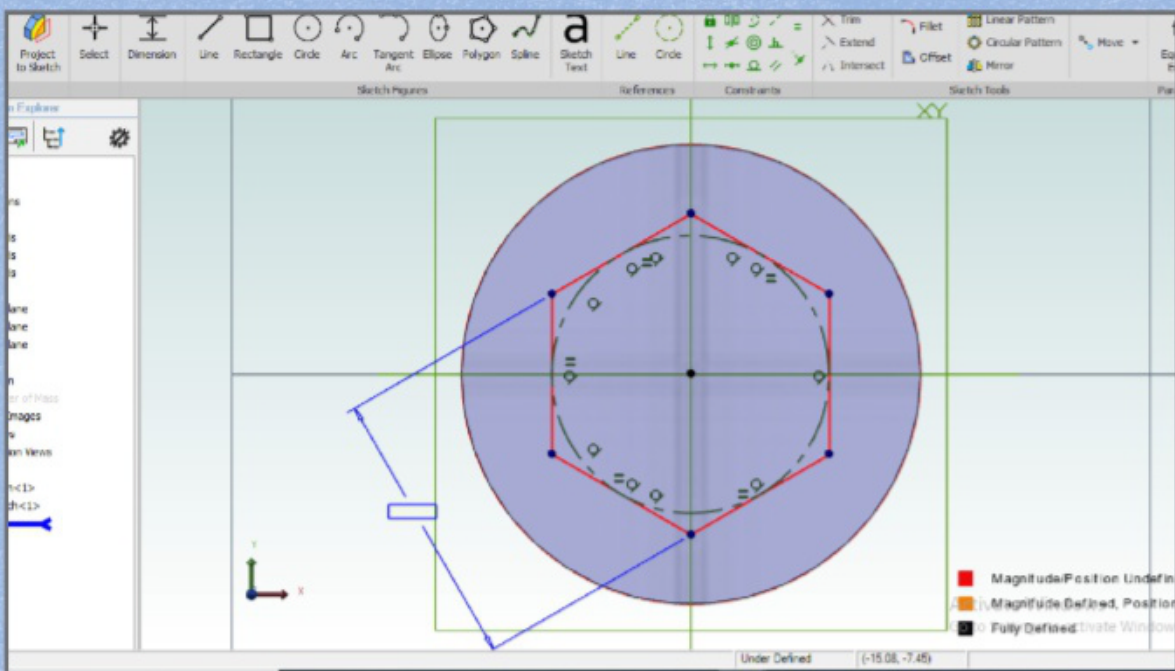


Figure 8: The Dimension tool in use

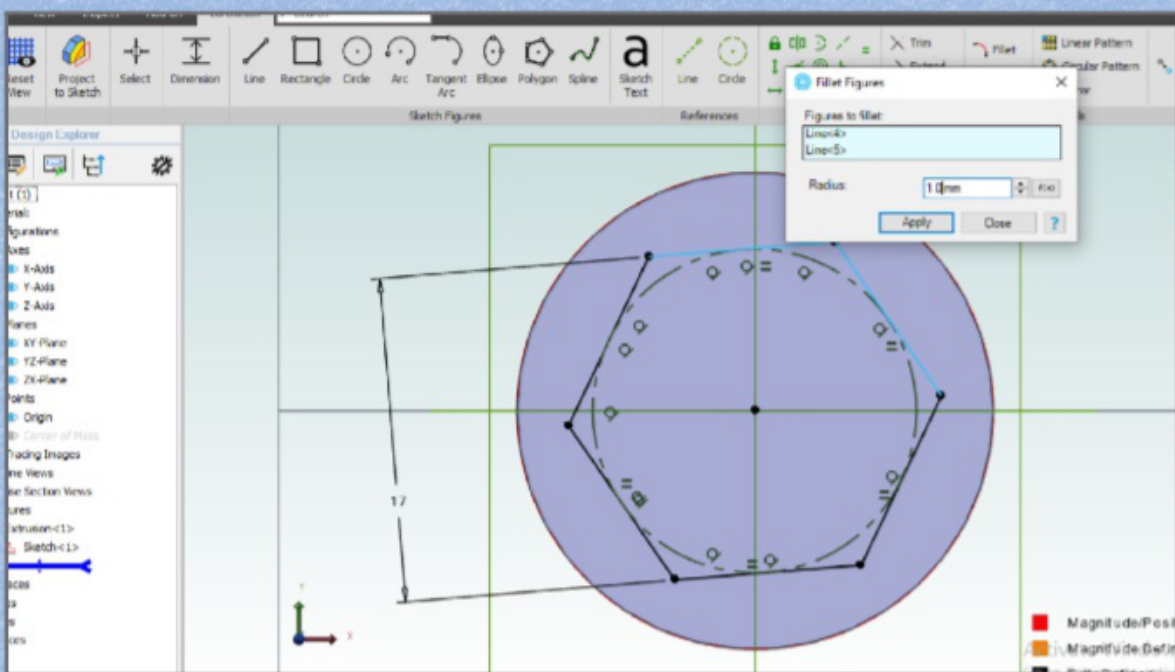


Figure 9: Setting the size

is a size that conveniently fills about half of the workspace. Do not worry about the exact size yet. You will set the desired size by inputting a dimension.

Click on the toolbar icon, 'Dimension'. Move the cursor on to the circle, which will then turn blue, and click it. As you move the cursor to one side, a dimension line appears. Hit the enter button and

type in the dimension 25. Hit enter again. The circle then resizes itself.

Going 3D

Click on the 'Deactivate sketch' icon in the toolbar. The toolbar changes to show which tools are now available. Click the 'Extrude' icon from the 'Boss (add material)' section of the toolbar

“This is how we change a 2D sketch into a 3D solid”

(fig. 5). This is how we change a 2D sketch into a 3D solid. The view in the workspace changes to show an isometric view, and a box appears where you can specify the depth to extrude to. Enter 80mm. Then click OK.

If the image does not fit the workspace, you can use the mouse wheel to magnify or minimise it. You can even alter its position on the page. Have a play with this to get familiar with how it works.

The first cut

To cut out the hexagonal hole you need to do a sketch on the end of the material and extrude a cut into the material. Click on the 'Activate 2D sketch' icon. Then move the cursor on to the end face of the material. It will turn into a blue disc (fig. 6).

Click it to select that face to make the sketch on. Select the 'Polygon' icon from the toolbar (fig. 7). A box will appear where you can select the number of sides to the figure. We want a hexagon, so six sides. Place the cursor over the origin point and click it when it turns blue. This fixes the centre of the hexagon. Move the cursor outwards and the hexagon shape will appear. Keep its size within the diameter of the circular material. Again, don't worry about the precise size just yet. Click to set the hexagon then click 'apply' in the box.

Now, click on the 'Dimension' icon then click any two opposite flats of the hexagon and enter the dimension of 17mm for the across flats size (fig. 8).

Before finishing this sketch and cutting out the hexagonal hole, a small radius is needed in the corners of the hexagon. In practice these greatly improve strength as it is easy for cracks to occur where there are sharp corners.

Select the 'Fillet' icon from the toolbar (fig. 10). A box will appear. The space in the box where it says 'Figures to fillet'

will fill out automatically when you select sides of the hexagon. Click on two adjoining sides of the hexagon — they will turn blue when the cursor is on them. Enter the radius size of 1mm in the box. Click 'Apply'. The corner radius will then be added. Repeat this for each corner of the hexagon. Then click 'Close' in the box.

Click 'Deactivate sketch' and the toolbar will change over to the 3D tools. Select 'Extrude' in the 'Cut (remove material)' section of the toolbar (fig. 10). The box will appear asking for the depth of the cut. Enter 50mm then click OK.

Manoeuvring

At this stage, you will be able to move the solid part around as if it is floating in space. Press and hold both left and right mouse buttons and move the mouse around to make the part float around. It is helpful to manoeuvre the part so the end that doesn't have the hexagon hole visible can be selected to sketch on for the square hole and the through hole. You can also move the part around in a purely linear way by depressing and holding the mouse wheel. The mouse wheel can also be rotated to magnify the image.

More cutting

Click on 'Activate 2D sketch', then select the end face that does not have the hexagonal hole. It will present that end face straight on to you. You need to create a hole that goes right through, and it needs to be big enough to clear the thread of an M10 stud — which is typically what a 17mm A/F nut fits on to.

Draw a circle using the 'Circle' tool as we did before when making the solid piece of material, with its centre on the origin point. Dimension it to be 11mm diameter by using the 'Dimension' tool.

Click on 'Deactivate sketch' then click on 'Extrude' in the 'Cut (remove material)' section of the toolbar. Enter

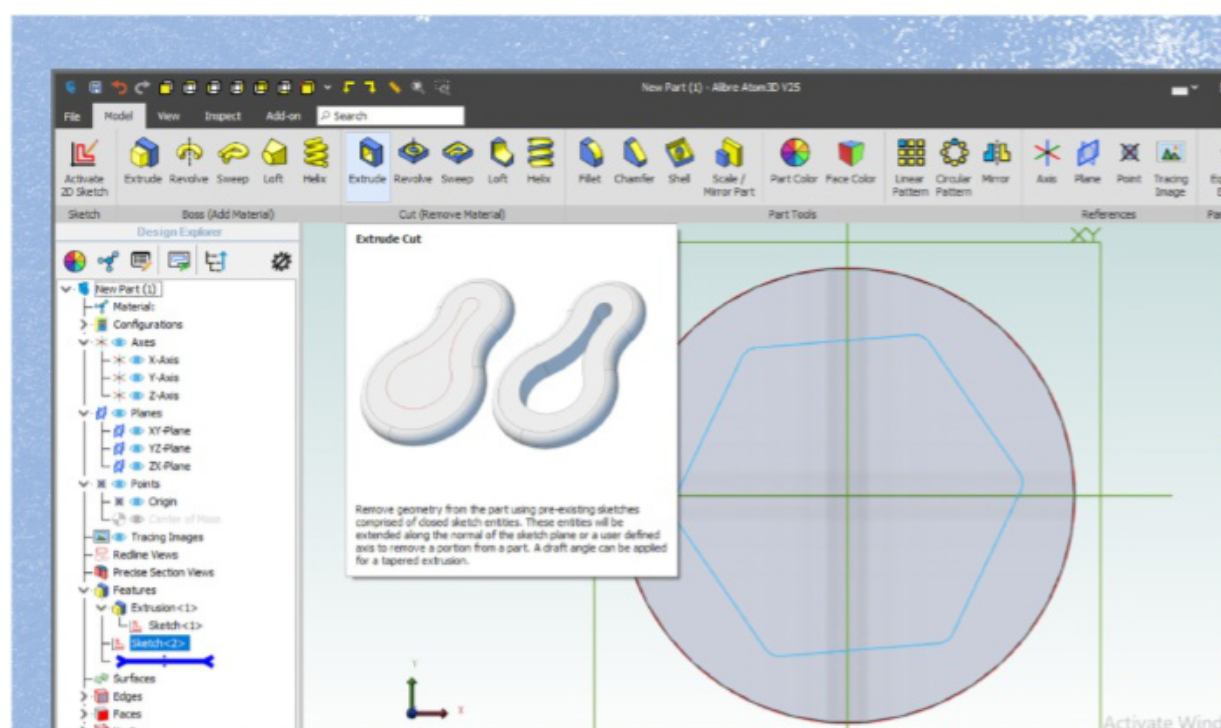


Figure 10: The Fillet tool

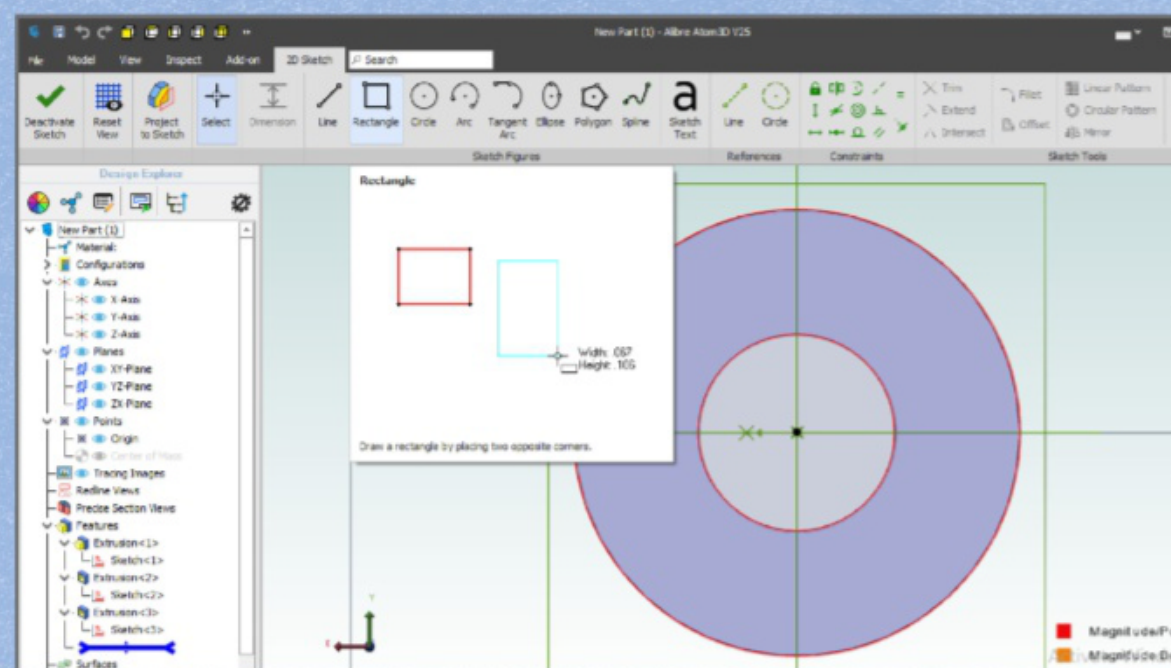


Figure 11: The Rectangle tool

-30mm in the box for the depth of the hole and click OK.

Click on 'Activate 2D sketch' again and select the same end face that we just used for the round hole. This time we are going to cut the half-inch-square hole. Select the 'Rectangle' icon in the toolbar (fig. 11) and make a rectangle to go around the outside of the round hole, but within the outside of the material. It does not have to be any particular size, or even square. The rectangle is made by clicking two diagonal corner positions located with the cursor.

Click one corner first and then, by

moving the cursor, the rectangle will pull out to where you place the cursor for the diagonally opposite corner. Click again to set the corner. Click the 'Dimension' icon and make the length of one horizontal side 12.7mm long by clicking on the side when it turns blue, then entering the size in the box.

Using the same procedure, make one of the vertical sides 12.7mm long. The rectangle is now a half-inch square. Next, it needs to be positioned centrally. Click on a horizontal side of the square and the horizontal centre line. Make that dimension 6.35mm. Click on one of the vertical sides of the square and the vertical centre line. Make that dimension 6.35mm also. Now the square is central. You can exit the 'Dimension' tool by hitting 'Esc' on your keyboard, but it will automatically close when you select another tool. ►

“There is a saving in wasted time and material when a problem is picked up in the design stage like this”

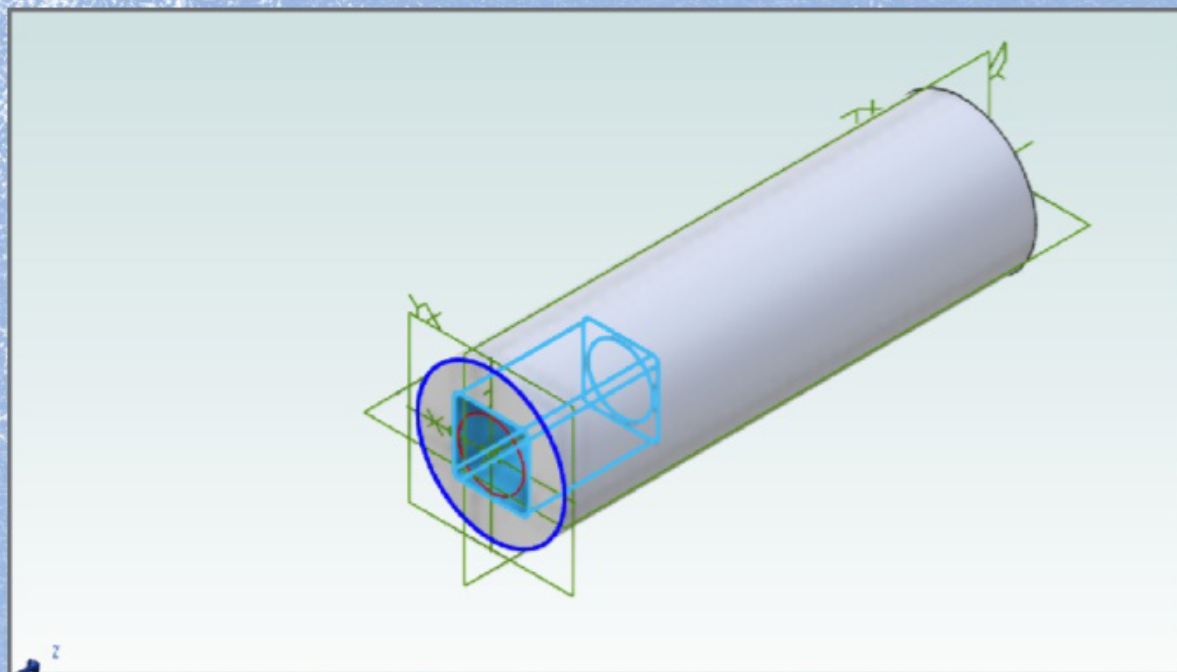


Figure 12: The selected edge turns blue

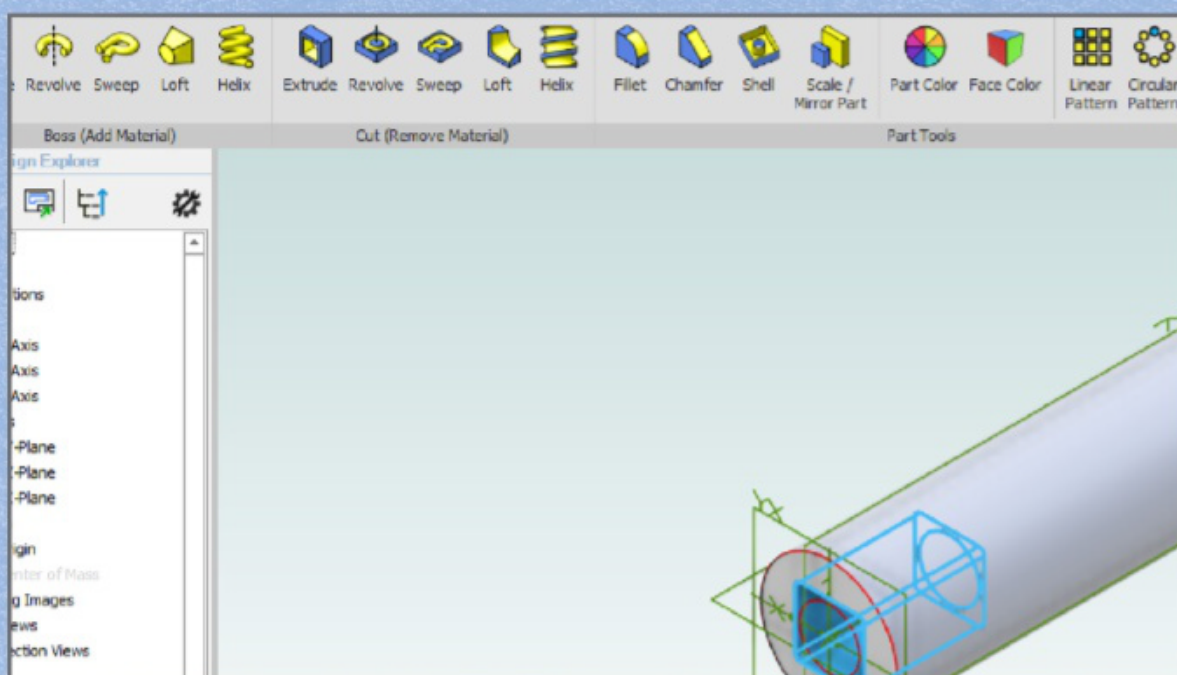


Figure 13: Fillet and Chamfer tools in the Toolbar

A corner radius is needed at each of the corners of the square — as we did for the hexagonal hole. The procedure is the same as before. Select the 'Fillet' icon and the box will appear. Click on two adjacent sides of the square, set the radius to 1mm, then click 'Apply'. Repeat this until all four corners have the same radius.

Click 'Deactivate the sketch' and then click on the 'Extrude' icon in the 'Cut (remove material)' section of the toolbar. Enter a depth of -22mm in the box for the depth of the square hole and click OK.

Tidying up

The socket part is now essentially complete, but we can do some finishing touches to make it more practical. To do this, we will use the 'Fillet' and 'Chamfer' tools found in the 'Part tools' section of the toolbar (fig. 13).

Click on the 'Fillet' icon, then select the outer edge of the end of the part. Before clicking to select, make sure the

circular line of the edge is all that lights up in the blue colour (fig. 12).

If it is difficult to select the line, you could use the mouse wheel to enlarge the part to create more separation between lines. Set the radius to 1.5mm in the box and click 'Apply'. The corner radius will appear. Do the same for the edge at the opposite end.

Next, chamfer the straight edges of the square and hexagonal holes. Select the 'Chamfer' icon (fig. 13). Select one of the edges of the square on the end face, then enter the size of the chamfer — 1mm. Click 'Apply' and all edges of the square will become chamfered.

Turn the image of the part around to see the hexagonal hole — press and hold both left and right mouse buttons, then move the mouse around. Repeat the procedure as for the square hole, again using a size of 1.5mm for the chamfer.

Congratulations, you have drawn your first complete part. If you had difficulties

“At this stage, you will be able to move the solid part around at will”

or made a mistake, I suggest you simply delete what you have done so far and start again. There are ways of changing what has already been done, but it is good to practise the moves and will be less frustrating at beginner level.

Before you close down the program, be sure to save your work. Click on 'File', then 'Save as', and give it a name. There will be some more work to do on this in part two in the following issue of *The Shed*, the November–December 2022 issue 105.

What have you learned from part one?

The pretty strip (ribbon) across the upper part of the screen is the Toolbar. It has lots of Icons that connect us to handy tools. The job that each of those tools does is spelt out when the cursor is hovered over them. To create a solid part — or piece of material from which to sculpt a part — we start with a Sketch, which has nothing to do with a pencil and the back of an envelope. We can turn the Sketch into a solid 3D item by Extruding out from it. The finished part is then created by using the 'Cut Extrude' function to remove the stuff we don't want — just as if we were drilling or milling the material. 🛠️

Coming up in Part Two published in the next issue of *The Shed*, the November/December 2022 issue #105

- We'll delve deeper into the capabilities of Alibre Atom 3D

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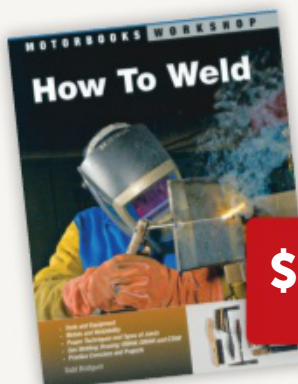
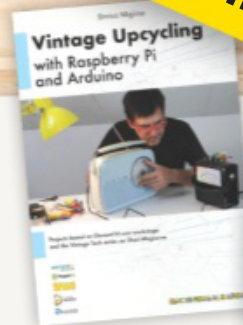
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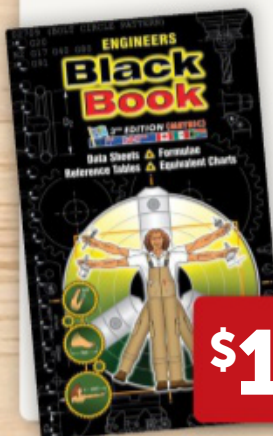


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GREENSTONE CARVING: TECHNIQUES AND CONCEPTS IN POUNAMU

By Len Gale

Photography: Owen Howard

Illustrations: Colin Wilson and Len Gale

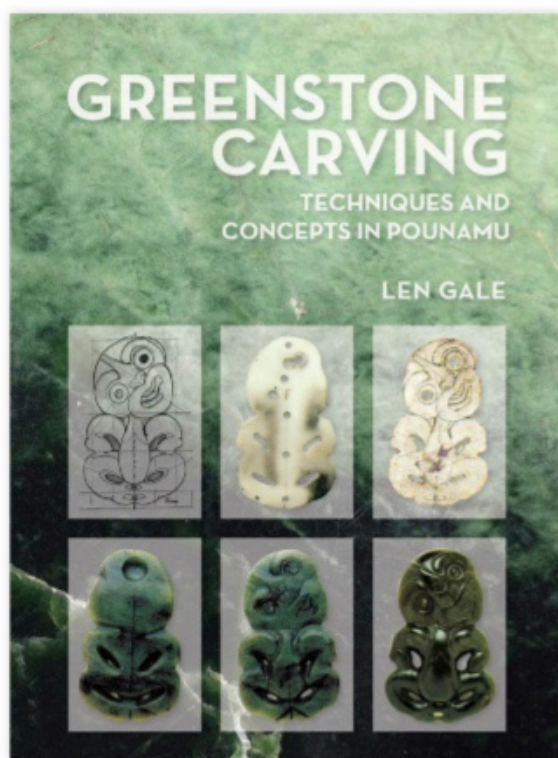
Review by Ian Parkes

As the “Further Reading” section at the back of this book shows, there are more than a dozen good books on traditional Māori greenstone carving and other decorative arts, some dating back more than 100 years. That is useful information, as it is quite likely that anyone who finds themselves immersed in this book will seek to broaden their knowledge. The goal of this particular book, however, is to show anyone with an inclination to give greenstone carving a go exactly how to get started and get proficient.

Traditional carving

Greenstone Carving begins with a couple of short chapters on Māori greenstone carving and the traditional forms. Author Len Gale’s admiration for Māori achievements with simple hand tools is easily understood when you appreciate how hard greenstone actually is and how much effort it takes to make a finely crafted tiki — even when using diamond-studded grinding wheels revolving at thousands of rpm.

While greenstone, or jade, carving evolved in several cultures, Gale sticks to discussion of the traditional



New Zealand forms of hei tiki, peka peka, manaia, hei matau, mere, koru, and pikorua. He also directly encourages people to take up the craft.

“There is a demand for good pieces, not only to meet the tourist market but, more importantly, to meet tribal or family needs. Māori are concerned that many of their taonga reside in overseas collections and need to be returned. Here then is a challenge to our talented youth: produce perfect replicas and not only effect an exchange with museums

but add to the collections so that other people can appreciate these time-worn skills from Aotearoa.”

The origin of their craft

Gale says that it would be a great step forward if craftspeople, woodworkers in particular, took to wearing a toki, or adze, pendant, denoting their skill and the origin of their craft. He asks if we owe a royalty to Māori, and says we do. He suggests giving koha to a local Kōhanga Reo or marae.

Of course, artistic lapidarians can do whatever they want, but this book will not only inspire people to learn a new craft but also give them excellent suggestions on what to make and how.

Gale shows variations on the hole-type and slot-type tiki and other traditional forms as well as also step-by-step instructions on the techniques used to achieve them. He describes in detail how to make a smooth disc with a softly blended hole in it as a first project. This is typical of his highly practical approach, and I imagine would give many people a good idea of whether or not greenstone carving is for them.

Beautifully presented

The author’s writing style is direct, economical, and elegant, making his book a joy to read. The design does without the numbering and formal organisation of a manual — although it could work as such — making passages easy to read. You can picture yourself working each piece as he describes. It is a beautifully presented book too, with plenty of white space, giving the text and images room to breathe and be fully appreciated, but it is also an excellent reference to dive back into as you complete each step.

I could imagine the enthusiastic neophyte highlighting sentences and making notes in the ample margins. Looking at the pristine pages, that seems like an insult to such a lovely artefact, but the reader could be sure author and craftsman Len Gale would be smiling indulgently if he were to witness it — from wherever he is now; Len Gale died in 2016, aged 89. ►

The goal of this particular book, however, is to show anyone with an inclination to give greenstone carving a go exactly how to get started



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ELEMENTS OF DESIGN

Probably the most popular of shapes is the circle. Discs of various materials have been worn or used as talismans but few, if any, have better surface texture or colour than pounamu. Later in the book I will devote a chapter to a sure, fast method of making discs, and ways to devise other appealing shapes from the basic circle. A variant of the circle is the spiral and, as in other cultures, Māori have perfected and adapted spirals to link their lives with nature.

This linkage would have developed from group discussion and collective efforts; today we would call it bouncing ideas off each other. This, in my opinion, is the best way to develop good design. Close contact with other carvers and regular visits to museums, a way of forming a partnership with the dead, all help to improve skills and design. In addition there are numerous reference books which help form a bridge to the future.

Contact with other craftspeople is vital, even if they are working in another field. It is important to be able to go to another person and show them your efforts, saying, 'Look at what I have made ... what do you think?' Then later they will come back to you with.

The circle is the starting point for many appealing designs, such as these karapepe.



Morakihau

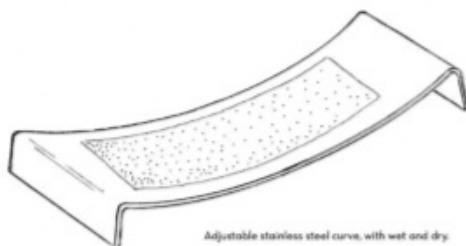
TOKI

It would be a huge step forward if people who worked with their hands wore toki to denote their skill. In particular, wood carvers would be saying, 'This is the tool of my ancestors - it is where I began.'

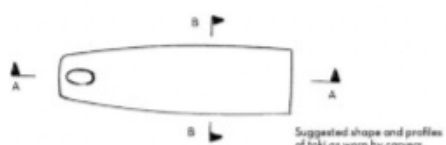
Stone of various thicknesses can be sawn to shape and ground on the 200-mm-diameter disc to the point where hand rasping and a final polish on the rubber tube wheel finish the piece.

Larger toki take more time but the process is much the same. A large block of sandstone worn to the contours gives that realistic look to the adze. Sandstone cuts reasonably well but the addition of white-flint sand really speeds things along. A piece of stainless steel bent as shown in the figure on page 41 allows for various grades of wet and dry to keep the curve and the final polish. The curve can easily be changed by bending the steel.

See the two cross-sections of an adze that determine the final shape (figure on page 41).



Adjustable stainless steel curve, with wet and dry.



Suggested shape and profiles of toki as worn by carvers.

The author's writing style is direct, economical, and elegant, making his book a joy to read

essential tools and techniques describes, and shows, in his own illustrations, how to make a drop saw for cutting large pieces from angle iron, bars, belts, and brackets, as well as a slabbing saw and a trim saw. He describes how to make abrasive point cutters from old four-stroke engine valves, and catalogues the profiles needed; how to make polishing heads from hot water pipe insulation and wet and dry; and the importance of water drips and baths, made from plastic containers, to keep cutters cool. He also suggests that you make knives and rasps by cutting down and adding a backing handle to old circular saw blades. You can't help feeling that he believes a genuine craftsman, as in ancient times, also makes his own tools.

The main part of the 84-page book is taken up with describing how to achieve certain forms, with many tips along the way, such as sleeving cutters' shanks to the same diameter to make swapping them easier, and grinding a flat on the shank of a core drill — making it run a little off-centre ensures a smaller core, which will fall easily out of the drill.

Seeking inspiration

While offering many design suggestions, Gale encourages carvers to seek inspiration from other artists, books, and museum displays that will tap into a stream of vitality — or, as he puts it more prosaically, "form a partnership with the dead".

A treasure in its own right, the book is also full of other treasures, namely well-lit pictures of pieces by some of New Zealand's most celebrated greenstone carvers. Reading this book only serves to deepen your appreciation of the skill and artistry on display. 📖

The book was republished this year by Oratia, whose founder, Peter Dowling, had previously published it and three other Gale titles while with Reed Publishing.

Len Gale

Dowling's obituary of Gale (1926–1996) describes him as leading "a colourful life, and one characterised by a generous concern for others".

Gale was a social activist; he was a pamphleteer during the 1951 dock workers' strike, and maintained a strong social focus throughout his life. His business card described him as a "working class artist".

"As a craftsman he was noted especially for his work in metal, and he gave back much to the communities of West Auckland and Ngaruawahia, assisting schools, marae, and craft

groups," said Dowling.

He admired Gale's deep knowledge of these crafts and his abilities as a writer, illustrator, and cartoonist. He formed a strong friendship with Gale, and published three further books: *Wood Carving*, *Creative Metal*, and *Technology Basics*.

Toolmaking

While you can probably buy many tools off the shelf now, Gale's chapter on

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What's in a name?

LOOKING AT THINGS FROM DIFFERENT PERSPECTIVES BRINGS REWARDS

By Mark Seek

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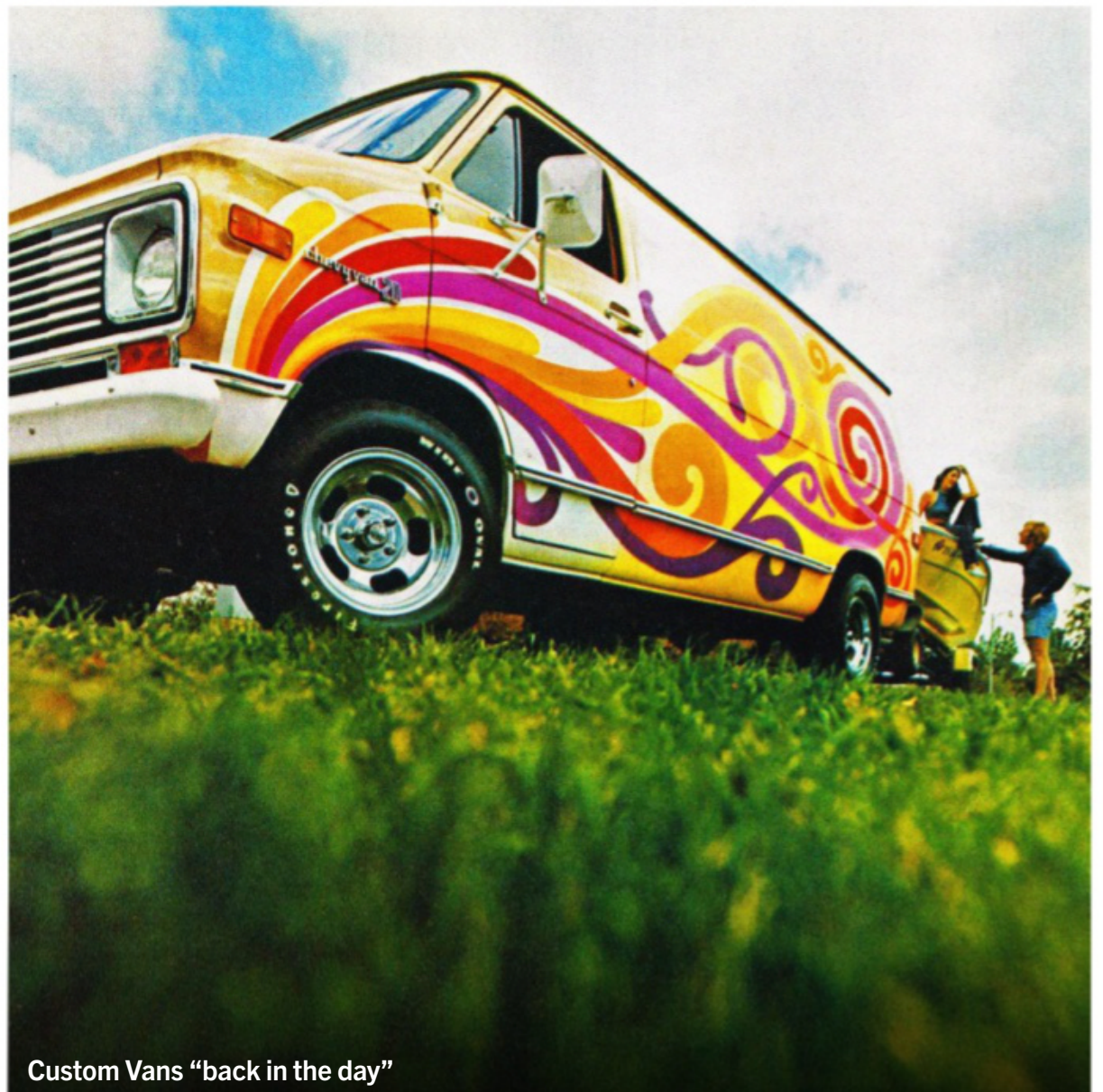
On my route to work one morning, I noticed the car I had been following — an innocuous Toyota — had the name 'Innova Crysta' boldly emblazoned on it.

I asked myself what possessed Toyota to call a car that — but wait, car manufacturer Mitsubishi created the 'Minica lettuce'! I mean, come on — and my apologies in advance if you drive either of these vehicles — you could have asked a three-year-old toddler to choose a name and it would be an improvement. It made no sense to me, and that got me thinking: does a product name have any relevance in my decision-making process? Is there in fact a part of my brain that detects what is 'cool' and what is 'rubbish'?

Vespa was recently approached by a rather large company wanting to purchase its name, but no deal was struck. According to a reliable source, the name 'Vespa' has been valued at US\$1billion. Is its value based on 'coolness', I wonder.

Avoiding the not cool

I have been known to avoid people who ride or drive certain bike brands and car brands. According to my dear wife, my thinking is bordering on prejudice. I had no idea I was prejudiced. I was chatting with a mate the other weekend. We were discussing motorcycles; as usual we both agreed that certain bikes from the past



Custom Vans "back in the day"

warranted the title of 'cool and classic', but only a certain few Japanese bikes.

There is your TX 650 — not to be confused with the XS 650 — then there is the H3 triple, and maybe one or two more. I don't know what it was about these brands or names of bikes; where the line in the sand is. I wonder if 'coolness' and 'rubbish' are discussed by other blokes. Perhaps amongst the

fisherman or the hunting jokers out there? Is there some distinctive code about purchasing an uncool rifle or fishing rod?

Hotrods, coolness personified!

There was a young chap who, when I first met him, was working for a hot-rod garage. He told me that they were always breaking down and fixing them was a nightmare. I was a little disappointed in this young fella's attitude. In my opinion, hot rods are coolness personified. To him, they were just troubled, outdated old cars and not worth mentioning. His concept of 'coolness' differed from mine, but, given time, I would see things from a new perspective. ►

"Is there in fact a part of my brain that detects what is 'cool' and what is 'rubbish'?"

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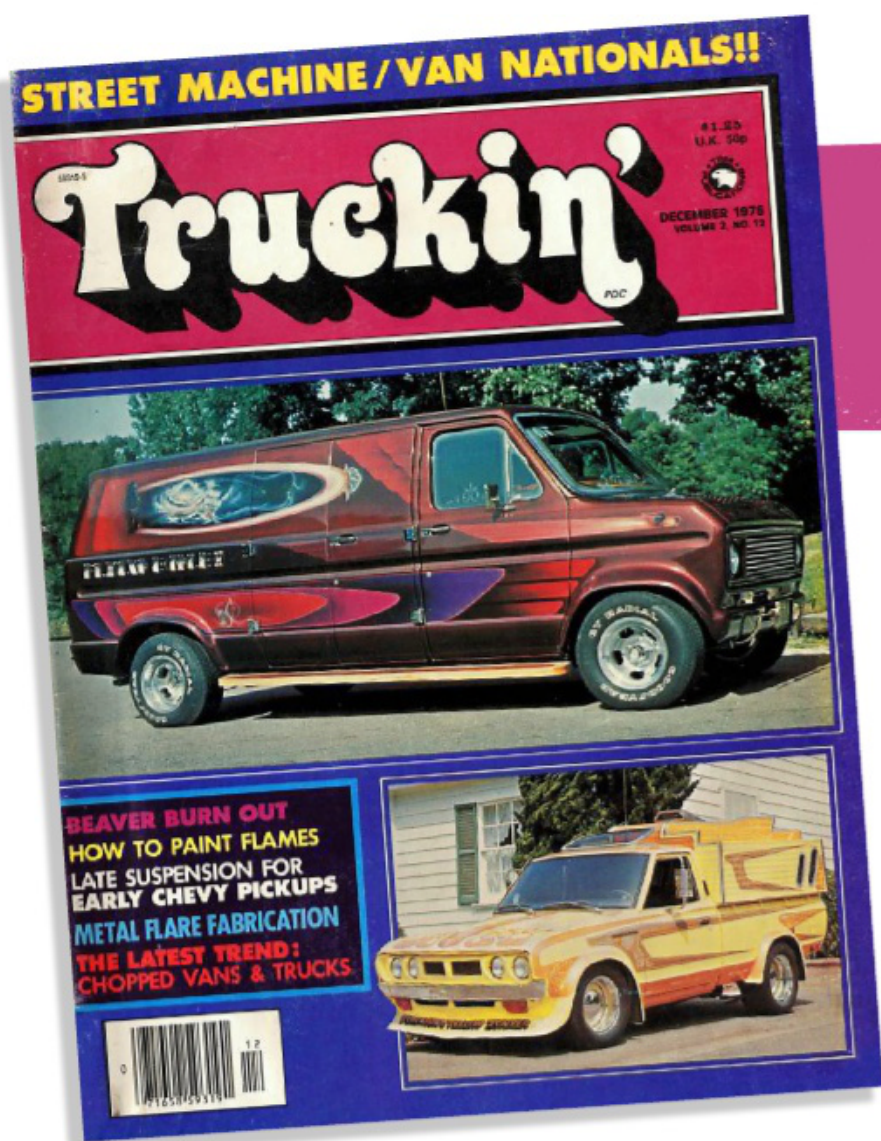
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“To my surprise, these so called ‘mates’ had no intention of allowing me back in the car”

Kodak Instamatic and briefly spoke to the owner of this magnificent machine. He was a happy kind of fellow, wearing a Mexican poncho and sporting mirror sunglasses. After shooting the breeze with my new vanner mate, I noticed that the traffic had begun to move so I headed back

to the hot rod.

To my surprise, these so-called ‘mates’ had no intention of allowing me back in the car. Apparently — according to them — I had broken some kind of unwritten rule and committed the unquestionable sin of admiring a custom van. This was something I needed to repent of and ask the hot-rod gods of speed to forgive me. My alternative? If I liked the van so much, why not jump in the passenger seat and go with them. I did repent, of course, and swore I would never look at another custom van as long as I walked this earth. Had I known that hot rodders and vanners were not supposed to cohabit, I would have restrained myself.

A declaration of peace

Somewhere in the past 30 years, I suspect the leaders of the hot rodding fraternity and the vanner community have got together over a beer, or perhaps a latte, and agreed to put their differences aside, allowing each other to congregate at events as if they had signed a declaration of peace and agreed to live in harmony — bloody hell, why was that not the case in the ‘80s?

You see people change, and when change occurs more people can enjoy a variety of all things ‘cool’. My attitude has changed, too; I am now free to choose what I like and will often allow myself to look at custom vans in all

their glory. I have recently had the bloke down the road park his 1400cc Kawasaki, complete with orange and purple graphics, in my driveway. It’s not my taste in motorcycles, but I have been out riding with him because he’s a good bugger and I do not really care what he rides.

Sometimes I need some wise words from my wife: to remember that not everyone has the same taste as me. And that is OK. She is right, after all; I need to be open-minded and not so closed off. With age, there’s a choice either to be stubborn and never open to change or to be open to change and new experiences. I am up for the challenge. How about you? I do not want to be left on the side of the road of life.

Take time to listen

Tolerance — do I have any? Well, it is a bit thin sometimes. Traditional thinking can clash with modern thinking. It’s having the ability to navigate that tricky area without losing sight of who you are and your values, in terms of where you are in your life.

I recently attended a car show. It was a laid-back affair, and every imaginable car and motorcycle was there. At one point, I was admiring a lime-green Plymouth. A young guy approached me and started telling me a story of his memory of the same car owned by his father. Some could have walked away and dismissed this bloke, but he wanted to tell me something important to him. Sticking around for a listen, and being open to another bloke’s opinion, is a step in the right direction. Let’s all take the time to listen to one another’s stories, eh, and maybe our tolerance for each other will make life a little less stressful and one-eyed. Let me know how you get on; feel free to drop me a line at: markseek@rocketmail.com. 📧

Yes these and flared jeans were all the rage!

Going back in time, I vividly remember travelling home from a hot-rod event. Heading home was always a sad occasion. Thoughts of going back to work with a supervisor who did little to instil confidence in me. Yet, here I was with my mates — a little worse for wear — when up ahead we approached a line of stationary cars.

The line stretched a few hundred metres. At the time, the Taupo road could be treacherous in winter, and some poor bloke had run off the side of the road into a big ditch. We jumped out of the ‘34 Chev to stretch the legs; it looked as if we were going to be there for some time while waiting for the towie from Te Pōhue.

A cool Bedford

Then I noticed, in the distance, a custom-painted CF Bedford van. You know the sort: back door welded up with tinted windows. Upon closer inspection, I could see the interior — lashings of psychedelic paint, faux chandeliers, and acres of crushed velvet. The long chrome Lake pipes, mag wheels, and an obligatory radio aerial adorned the outside.

‘Wow!’ I thought to myself. ‘Now that is cool.’

I snapped a few photos with my



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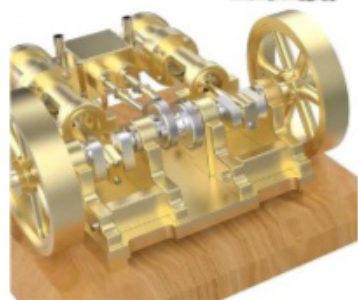
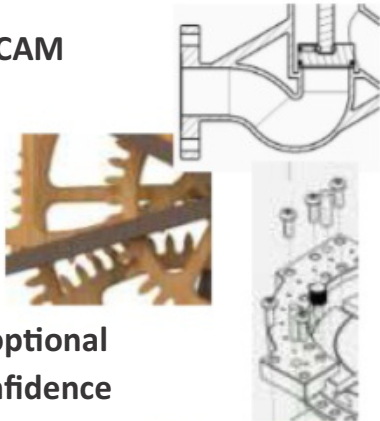
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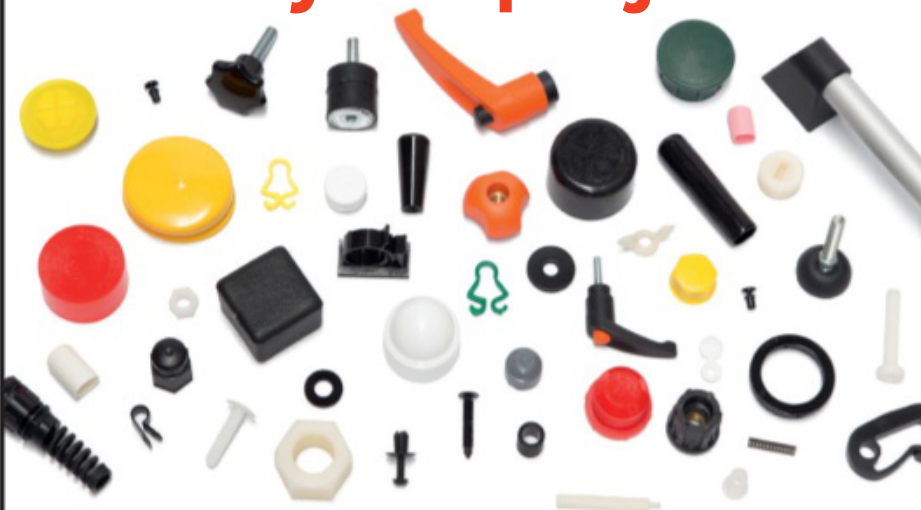


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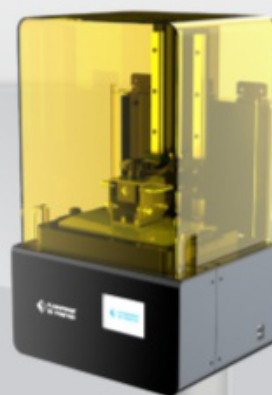


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TIME-HONoured CRAFTSMANSHIP

Watchmaker Reg Horner is one of a diminishing band still practising his craft. He has a particular interest in the large clocks that were once a focal point of many communities

*By Ian Parkes
Photographs: Brian High*

It's almost a cliché of old black and white spy movies: a man wearing a trench coat and a trilby checks his watch. He realises it has stopped. He winds it up and glances up at the local clock tower to set the time.

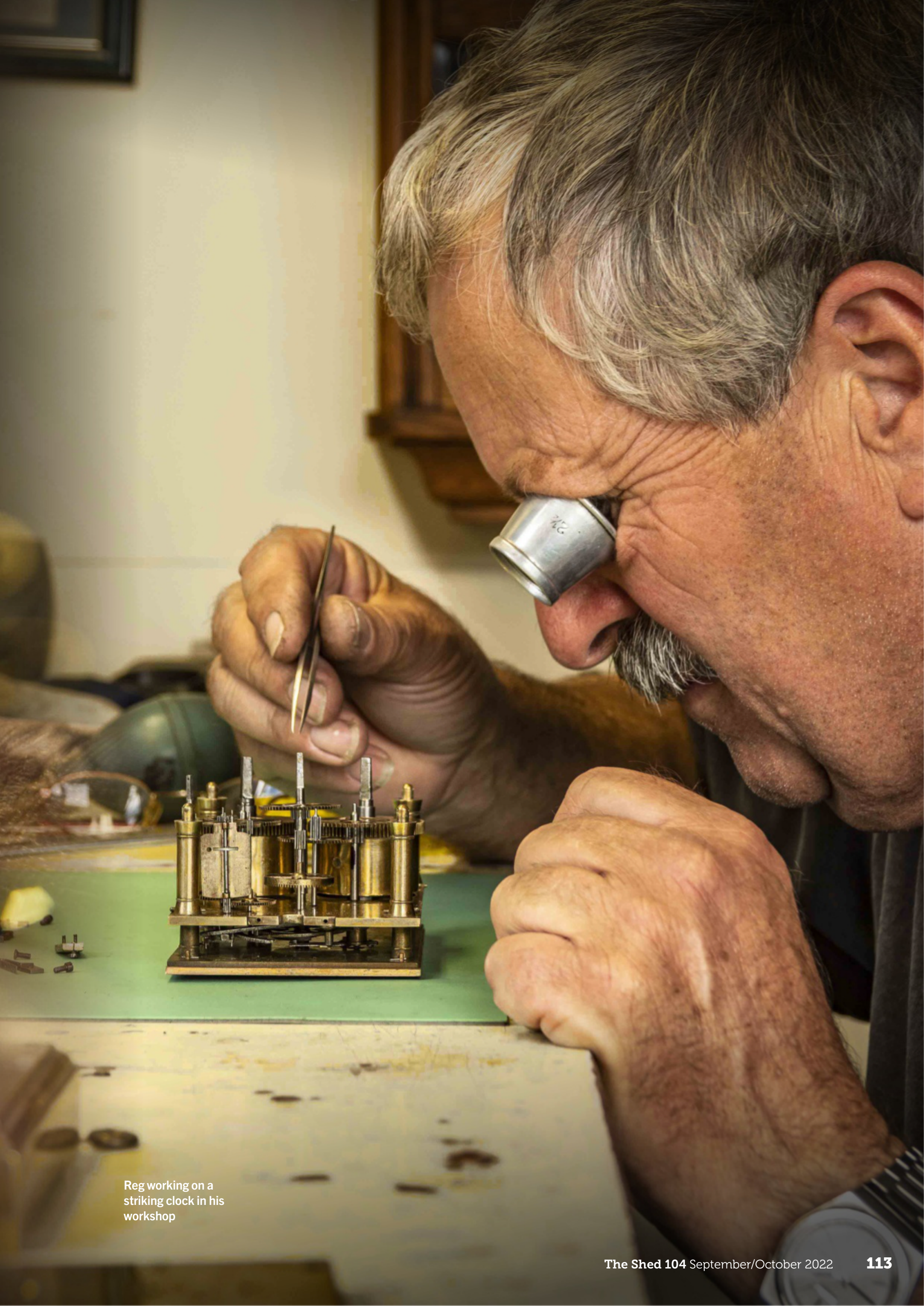
Back then, all watches needed winding and keeping town clocks accurate was an important civic duty. However, that

whole scenario is passing into history.

It's a curious business, considering the art of the watchmaker. When most of us were growing up, the trade of watchmaking, if not as common as plumbing, carpentry, or motor mechanics, was not at all rare. Everyone had a mechanical watch, and there was a 'watchmaker' employed at most of the

bigger high street jewellers to clean, adjust, and service watches and, of course, clocks. Almost every home had a clock on the mantelpiece and one on the kitchen wall. How else would you know how long you had until you had to go to work, or when to put the tea on? When you got to work, you often had to clock in. ►





Reg working on a striking clock in his workshop



The mechanism of a striking clock



An antique clock mainspring

A watchmaker

The title ‘watchmaker’ is of course not strictly accurate, although it dates back to a time when such people would often make the parts they needed. Most were no more pure makers of watches than mechanics are carmakers, but, like mechanics, their ability to bring complicated defective machinery back to life again kept them very busy.

The watchmaker’s workload reduced significantly with the advent of digital or quartz movement watches in the 1970s. Still, batteries needed replacing and those watches will continue to benefit from cleaning by someone who knows what they are doing.

However, even the habit of wearing watches is going out of fashion. Nowadays, ask anyone under the age of 30 the time and they will usually refer to their phone — probably after you giving you an odd look as they wonder why this troglodyte couldn’t do that for himself.

“Their ability to bring complicated defective machinery back to life”

Luxury not necessity

As watches are no longer a necessity, they have become items of jewellery. This trend has become even more pronounced at the higher end of horology, where much effort and expense go into the design of cases, dials, hands, and complications. New designers will regularly attempt to carve out a niche and make a name for themselves in this luxury field — but that is watch design rather than watchmaking, per se. Most of these designer watches use movements supplied by other makers, whether they are the common Swiss automatic mechanical movements by ETA or Sellita, or the much less interesting but accurate quartz movements. These are

high-end items, costing thousands, and as such are an indulgence enjoyed by an increasingly rarefied clientele. Some mechanical, usually automatic, watches are still available for a few hundred dollars but most, including Seiko’s popular divers’ watches, now cost more than \$1000.

As a result, the demand for a watchmaker’s services has shrunk; as the last big generation of watchmakers has retired, they have simply not been replaced. So it’s a pleasure to talk to a living and breathing example: Reg Horner.

Watchmaker extraordinaire

Reg Horner has been a watchmaker all his life, since completing his apprenticeship of four and a half

years in a retail shop in Victoria St, Christchurch.

The business moved to Hornby Mall and he worked for another business for a couple of years before going out on his own. Reg said he had workshops in four or five buildings over the next few years before the earthquake decided he needed another move. The solution was to work from home in a Portacom on his front lawn at Tai Tapu, south of Christchurch.

“It took 30 seconds to walk to work,” he says.

Most of Reg’s work still comes from jewellers. He travels about the district collecting jobs from different jewellers.

Reg and his wife Glenda have now moved to Fairlie, where Reg has friends in classic car circles. Every year for 47 years, he has taken part in the Irishman Creek rally, hosted by the town at Queen’s Birthday weekend. Fairlie also provides easy access to Timaru, where Reg has picked up more work. He now does work for a roster of about 10 retail shops, but there’s no getting away from the changes in the industry.

Lack of spare parts

“It’s getting harder and harder to get spare parts,” Reg explains.

I wondered if this meant a return to the days of making parts.

“I have a couple of lathes, and in the old days we used them all the time.”

But now for watches it’s largely impractical. The vast majority of watches use quartz movements.

“There’s a lot of plastic parts, and it’s not viable most of the time,” he says.

Reg says when Seiko brings out a new watch it carries enough spares for the watch for the next five years, but after that there are no guarantees.

The rationalisation in the industry has helped to some degree, as many different brands, especially watches with fashion brand labels, will use the same movements.

“You can’t always go by brand. You never know what you are going to find. Different brands will have the same module inside. In this business now, it is all about looks. There’s no longer the quality there.”

Then there’s the problem of agencies and authorised dealers wanting to keep the work in-house, and there is very little that independent watchmakers can do about it. Perhaps the new ‘right to repair’ legislation, recently enacted in Australia and won on behalf of independent vehicle workshops, needs a watchmaker’s test case.

Authorised repairers

One customer came to Reg with a well-known brand of watch. It needed a new crown — a fairly standard job. Reg contacted the agents, who said he would have to send the watch to Australia to get a written report on it first.

“I suggested to the customer that they buy a different brand in the

“He travels about the district collecting jobs from different jewellers”



A late 1800s American Ansonia striking mantle clock which Reg restored for a client

**“Fortunately,
I have a lot of
spare parts. A
watchmaker
never throws
anything away”**

future.” Another customer came in with a \$10,000 Cartier watch that needed fixing. Reg opened the watch, discovered the problem, and called the agent in New York to get some new parts. She asked if he was an authorised repairer. He said the owner had asked him to repair it so he guessed he was. That wasn’t what she meant, apparently. So Reg asked the Cartier agent on the phone to say he was an authorised repairer. Surprisingly, she obliged. Reg then asked if she would send him the parts. She still said no. At least they had a good laugh.

Even when you can get parts, it’s getting prohibitively expensive to get them from distributors and agents in Australia.

“They used to send them in small envelopes, like the old pay packets,” says Reg.

However, the postal system isn’t what it used to be.

“They kept losing them all the time. Now they ship them in great big envelopes, which cost \$33 a time.”

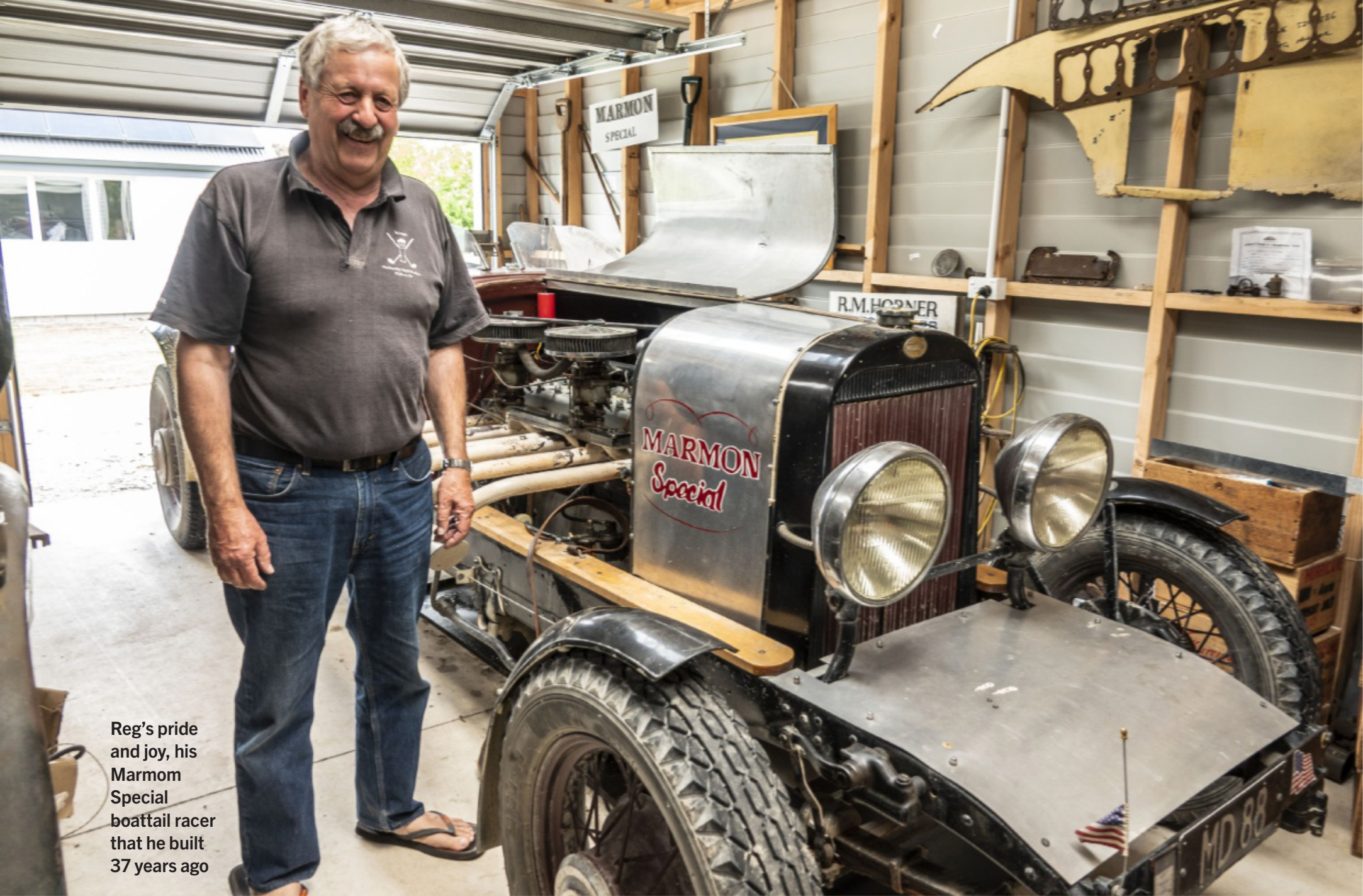
Reg’s collection

A key part of Reg’s business now is his collection of old clocks and watches. It’s his reservoir of many of the parts he needs to keep other watches going. “Fortunately, I have a lot of spare parts. A watchmaker never throws anything away.” ►



Reg alongside a Lyttleton jeweller’s shop clock which was gifted to him by the owners’ son. This clock is over 150 years old





Reg's pride and joy, his Marmon Special boat-tail racer that he built 37 years ago

The book of Marmon

Reg Horner is one of life's great enthusiasts and one of his passions is cars, of several different vintages. He has a 2007 Mustang and a 1976 Lincoln Continental but the most intriguing are a couple of Marmons. Yes, that's right, Marmons.

It's not a brand known to many, but Marmon made substantial cars — along the lines of Packards — right through until 1933. The marque was established in 1902 and a six-cylinder Marmon won the first Indy 500 race in 1911.

There are a couple of Marmons in Dunedin and another in Whangamata but Reg owns three — two runners and one awaiting restoration.

"I'm trying to corner the market," he says.

The cars Reg owns have straight-eight engines but Marmon also produced a V16-engined model. It was the only model Marmon made in 1933. Clearly, it was aimed at the top end of the market but it didn't save the company — in fact, more than likely it was responsible for the company's collapse in that year.

"There are a couple of Marmons in Dunedin and another in Whangamata but Reg owns three"



The historic Marmon Wasp that won the first Indy 500 on display at the Indianapolis Motor Speedway museum.

Reg's enthusiasm for the marque has seen him travel to the US for a couple of 'Mighty Marmon Musters' so he has been for a ride in one of the big V16 phaetons. As you'd expect, it was almost unnaturally smooth. He asked the owner how he could tell if one of the cylinders had stopped working.

"You can't," came the laconic reply.

Reg recalls that the car, which did five miles to the gallon, ran out of fuel on the freeway. Reg thoroughly enjoyed the whole experience but his host was not amused at all. ►

Most of the time, given the commonality of movements, he will have exactly what he needs but there's also the possibility of adapting other parts to suit, calling on the skills from earlier times.

Is there a brand Reg does like?

"Olympic. They seem to be pretty rugged."

Clocks are also a big part of Reg's repair business — about half of it — often mantelpiece clocks but also grandfather clocks as they are known here and in the UK, or long case clocks as they are known in the United States.

A lot of repair work involves removing years of accumulated grime but a

common problem with the heavier internals in bigger clocks is that pivot points wear out and holes wear into ovals. Reg fixes those by reaming them out and pressing in new bushes.

Bad news for grandfather clocks

Standing to attention in Reg's workshop are a number of grandfather clocks needing repair. He says the Christchurch earthquakes were very bad news for grandfather clocks.

"A lot of them in hallways were on hard floors, tiles and the like, and a lot of them face planted." ►

"The Christchurch earthquakes were very bad news for grandfather clocks"



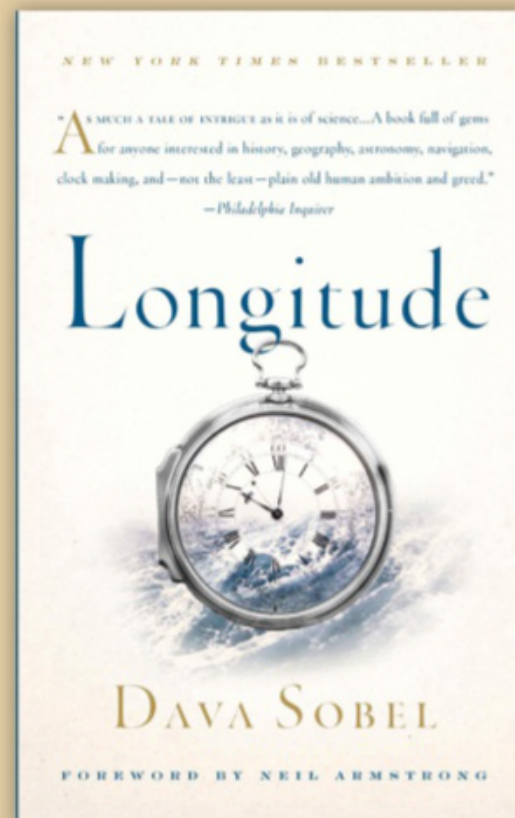
After the Christchurch earthquake, Reg restored over 90 grandfather clocks. These are some he has for sale.

H is for hero

In 1714, the British Government offered the Longitude Prize of £20,000 — the equivalent of millions of pounds today — to anyone who could find a way for navigators to work out their longitude accurately when at sea. Inability to do this made it very difficult to plan voyages, or even find somewhere you had already been, without 'running down the latitude'.

Yorkshireman John Harrison, who made wooden church clocks, set his mind to it. He worked at it for decades, developing large and sophisticated timepieces. Even as he got closer, the great minds of the day, which included Sir Isaac Newton, assumed the answer would be in an elegant treatise on the movement of the stars, not in some clacking device invented by a lumpen carpenter. Harrison argued that if you noted the time the sun hit noon at your current location, and knew when it was noon in the port you had left — by looking at a clock that kept accurate time — you could work out how far around the globe you had travelled.

Anyway, John Harrison showed 'em — after switching tack to a much smaller pocket watch chronometer design for his 1755 H4 design, which for the first time used jewel bearings to reduce friction. Despite scepticism that meant the prize was withheld for years, Harrison's theory proved successful. It helped build Captain Cook's reputation as a brilliant navigator and cartographer, on the way to establishing the true diameter of the earth, and in turn its distance from other heavenly bodies.



Competing in the annual VCC Irishman's rally with the Marmon Special. Reg's son James is navigating



The book of Marmon (continued)

Why Marmons?

As mentioned earlier, Reg has been a regular at the Irishman Creek Rally, held in the South Island high country every year. A regular attendee a few decades back was a gentleman called Ray Disher. Ray used to drive a large open-cockpit Chrysler Special with a large drainpipe exhaust down the side, powered by a Studebaker President straight-eight engine. It had a twin-speed 'town and country' diff, which meant it had another three gears for high-speed work on the open road.

Ray took Reg for a drive in it. At one point he asked Reg how fast he thought they were going. Reg listened to the slow beat of the engine and guessed about 50mph.

"We're doing 80," said Ray.

Reg recalls that Ray would join the rally in Tekapo.

"Ray would come over in the middle of the night. You could hear him for miles."

Reg decided he really wanted something

like that. He put the word out and the word came back that the remains of 1930 Marmon were to be found in an old builder's yard in Selwyn St in Christchurch. It had apparently done time in another yard by the overbridge on Blenheim Rd.

The Marmon had been the chauffeur-driven carriage of Sir Charles Lewis Clifford, and at one stage had been converted into a truck.

"It was pretty bad," he says.

All that remained was the 5.2-litre straight-eight engine's block and head, the chassis, diff, rear axle, and rear wheels.

Reg started acquiring bits. He found a four-wheel farm trailer made out of a 1930 Chevrolet, and the front axle assembly and wheels bolted straight onto the Marmon.

Reg planned to build an open tourer in the classic special style. He had studied pictures of racing car specials of the era so, without the weight of the seven-seater body to counterbalance it, he decided to move the motor back a whole two feet. ►

"The Marmon had been the chauffeur-driven carriage of Sir Charles Lewis Clifford, and at one stage had been converted into a truck"



A fair bit of work in progress in this garage



Marmon factory, Indianapolis





Repairing a manual-wind wristwatch

They would come apart and the cases would split. At the time, Reg was able to buy a number of badly damaged and broken clocks from owners who had given up on them.

Reg is pretty handy with woodwork so he was able to repair quite a few of the cases himself but he also has a joiner friend who took on the more challenging repairs. The clock part, of course, was meat and drink to Reg.

It is gratifying to know that many of those old clocks were saved. They did not go the way of many other historical and salvageable artefacts that were swept away in the desire to clear away and build new.

Bigger and better

Reg is also keenly interested in even larger clocks. One of his favourite possessions is a large clock that used to be under a verandah advertising the adjacent jeweller's shop, Lloyd's, in London St, Lyttleton. He knew the owner and his son. After the business closed, the son stored the clock under his father's house, then knowing of Reg's interest, he gave it to him.

Reg cleaned up the clock, got it working again, and propped it up in the window of the empty shop next door — he had the keys — so people could see it. The dial on it is about a metre in diameter. ►



A German-movement 1970s grandfather clock





The exhaust manifold and carburetor of the Racer

The book of Marmon (continued)

Traditional style

Reg and a friend, Mike Gealey, built the body in the traditional style, making a Southland beech frame to which they fixed plywood body panels. Reg found some Hudson headlights — smaller than the original 12-inch Marmon units but close enough.

The exhaust was straightforward, being of Reg's own design. He couldn't find an original carburettor but he found a pair of carbs at a swap meet — he's not sure what they are but they were "the most common kind".

The inlet manifold was another lucky find. It is a piece of square section steel Reg found on the workshop floor. He blocked it off and cut holes to suit.

"It works well enough," he says.

Reg owns two of the five 1930 Marmon coupés known to survive. He saw one mentioned in the club magazine, in rough condition. He contacted the owner but it sounded as if it was going to be too much work; there were too many bits missing. Reg was about to give up on it when the owner said he knew the whereabouts of another wrecked coupé that might furnish most of the parts he needed. Reg wound up putting both in a container and shipping them home to New Zealand.

Diligence rewarded

Reg now owned three Marmons but he was without a single bonnet. After a year of discussion he finally acquired one off a 'doodlebug', which is apparently what they called Marmons that were chopped and converted into trucks or suchlike for farm work.

He also acquired a pair of Marmon headlights at a swap meet in the States. They have a little Marmon crest on them — a real touch of authenticity — so, when his fixable coupé turned up without headlights, they went straight on. As is usual for cars of that era, the Marmon was equipped with just the one tail light. Again, Reg's diligence was rewarded with the discovery of an identical item for sale on eBay. The car now has the regulation two and is registered to run on the road in New Zealand.

Reg is still hopeful of bringing the wrecked car back to life. The chassis is bent to the left and the front axle is also bent, but it has only done 65,000 miles from new.

"It hit a tree in 1939 and it is still broken. Enquiries from potential sponsors are welcome," says Reg. ►



Racer dashboard

"Reg wound up putting both in a container and shipping them home to New Zealand"

This straight 8 engine in the 1930 Coupe that Reg has already restored. A second coupe is awaiting restoration





One of several “junk boxes” of spare parts

A selective history of horology

The automatic or self-winding movement was a significant advance. It employs a weight to wind the mainspring. Something like it was first invented by Swiss clockmaker Abraham-Louis Perrelet who used a side weight but Englishman John Hardwood patented the modern design in 1922.

The other innovation that deserves more credit than it often gets is the co-axial escapement invented by George Daniels in 1974, which was finally commercialised by Omega, almost 20 years later

Actual innovation in watchmaking is comparatively rare. When you think about it, it is not surprising this is the case. It is not a field that calls for great innovation, and hasn't for a while. Quartz level accuracy was achieved by John Harrison's famous chronometer H4 in around 1755.

Even then, while it was a pocket watch in proportion, the design of the movement was not the one adopted universally for the gentleman's accessory; it was too complicated to make commercially, but it did encourage others and the accuracy of timepieces continued to improve.

The pendulum clock and the balance spring had been around since the 1650s,

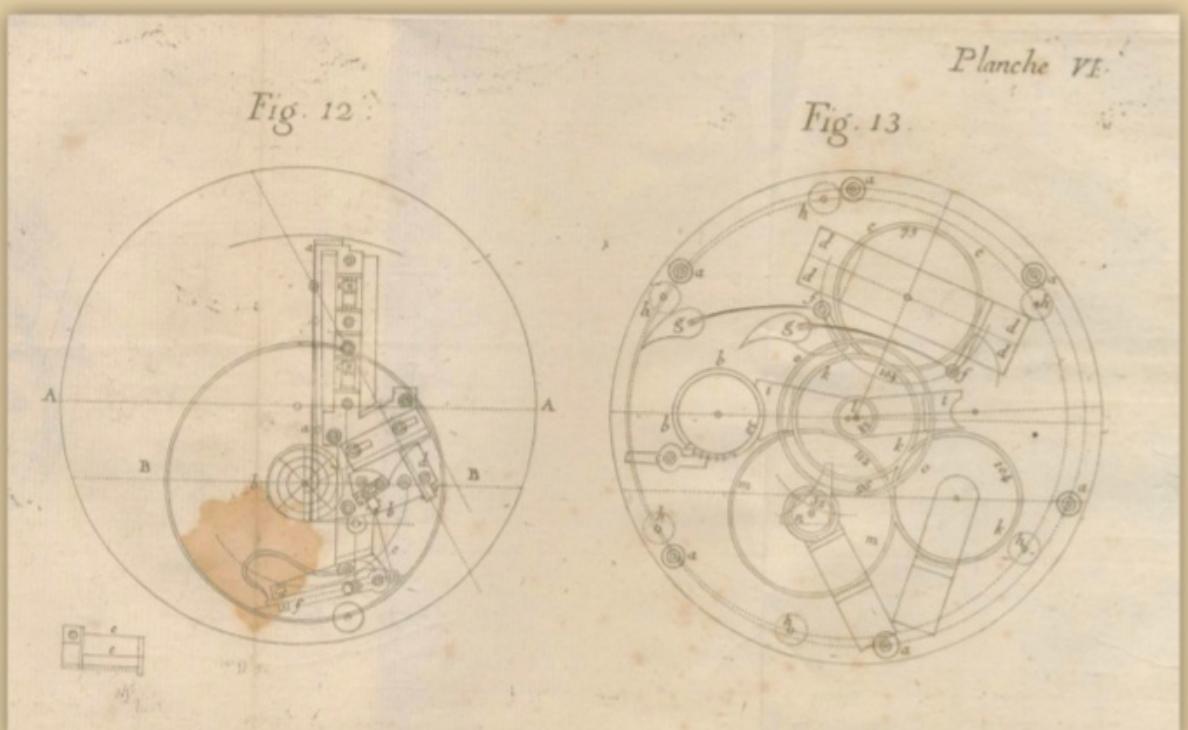
and the lever escapement, which did away with the need for a long pendulum, came along in the 1750s — usually credited to Englishman Thomas Mudge.

While other attempts have been made to innovate — hundreds over the years — those that have stuck have been few and far between. As reliability is such a key aspect of a watch or clock's function, and repeatability likewise in manufacture, the history of watchmaking is logically one of continued refinement of what has already been proven to work.

The mainspring

As a result, a watchmaker from the mid-to-late 18th century would know and understand everything in a modern lever watch running off a mainspring. After almost 300 years it is still the same thing, which is the most remarkable thing about it and is one of the things that give enthusiasts of mechanical watches great pleasure.

There have, of course, been many advances in materials and manufacture but just a couple of genuine innovations.



Reg says the clock is English. He doesn't know exactly how old it is but someone had felt moved to inscribe somewhere on the inside of it that Belgium had surrendered, marking the last day of the Great War.

Reg is keen to track down other large old clocks. He would particularly like to know the whereabouts of a clock that was in the tower of the old Catholic church in Pleasant Point. The congregation has a new church now.

"The old church had a great big old clock but I can't track it down."

Rangiora Post Office clock

It was Reg who restored the former Rangiora Post Office clock. It had been taken down and dismantled and some parts were missing. Reg knew of the whereabouts of a similar clock, also in bits, in Ashburton. He and Richard Spark, who had asked him to fix up the Rangiora clock, went to look at it. They

found it "in a box that looked like a coffin" in a shed with a dirt floor.

However, there was enough of it there to get patterns to make the missing parts for the Rangiora clock. Richard, who owns a museum in Rangiora, built a tower for the restored clock, which had its own official opening.

"The newspaper was there and my mum came along," says Reg. ►



The Rangiora Post Office showing the functioning clock



Co-axial escapement invented by George Daniels

The automatic or self-winding movement was a significant advance. It employs a weight to wind the mainspring. Something like it was first invented by Swiss clockmaker Abraham-Louis Perrelet, who used a side weight, but Englishman John Hardwood patented the modern design in 1922, in which a weight, swinging around a central axis as the wearer moves his or her arm, winds the spring. The concept helped Rolex build its reputation, and the idea really took off in the 1950s.

The big breakthrough was the radically new quartz oscillator movement. It has actually been around since the 1920s but

new manufacturing methods saw it enter the mainstream in 1969. The Bulova Accutron from the 1970s was truly a marvel of the modern world. LCD digital watches like those made by calculator company Casio became popular, and some feared they were destined to replace traditional dials. Now, those early models are rare and collectible. Then Swatch popularised the cheap and, yes, disposable watch in the 1980s.

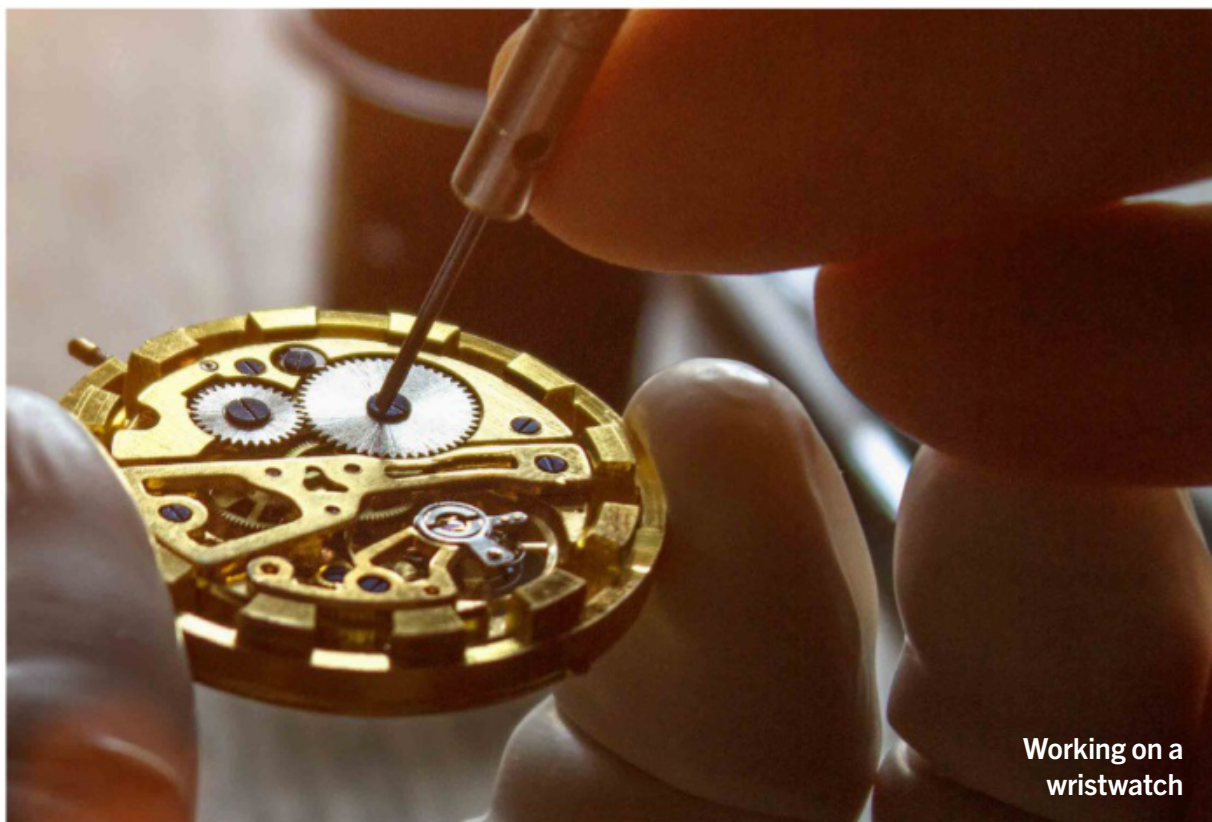
Innovations

Since then we have seen the addition of high-accuracy quartz, solar-powered quartz, and anti-magnetic materials and

component designs. Another innovation that deserves more credit than it often gets is the coaxial escapement invented by George Daniels in 1974, which was finally commercialised by Omega almost 20 years later. A third finger on the lever co-operates with its fellows to move two additional cogs on a shared axle. This radial friction model virtually eliminated sliding friction, a main source of wear in the action of traditional 'Swiss lever'. This was the most significant advance in mechanical watches in generations.

Refinements

On top of that we have always had various accurately named 'complications', showing other time zones, moon phases, etc., and tourbillons — additions that improve accuracy. Occasionally, the very best makers will attempt something special in the way of refining a traditional movement. For example, the Piaget Altiplano Ultimate Concept watch was introduced in 2018 as a kind of horological showcase. At 2mm in depth, including the case and glass, it was by far the thinnest mechanical watch to go into limited production. Apparently other watches approaching that thinness had failed because their cases soon bent while being strapped over the wrist.



Working on a wristwatch



A movement holder allows for a stable repair and another hand, similar to a vice

Just what happened to the ‘coffin clock’, believed to have come from the Provincial Building, Reg has not been able to find out. Some said it went to the Plains Vintage Railway and Historical

Museum but, so far, enquiries there haven’t been able to confirm that one way or the other. However, we do know it is not the clock that stands on its own tower in the middle of Ashburton. Both

that clock and tower have been restored and remain a proud feature of the town.

Ongoing saga

Timaru’s clock in the tower that tops the city’s lovely listed civic building is proving to be an ongoing saga for Reg. The council spent thousands of dollars with another repairer to try to get it working, but without success.

“A friend was talking to one of the councillors, who was pretty keen to get it going, given the money they had already spent,” says Reg. “I rang him and he was keen for me to get a look at it.”

Reg discovered there had been talk at the council of replacing the old workings with “some horrible modern thing”. Reg understood the clock was made as recently as 1912. Clocks from



A selection of customers’ clocks



Reg keeping an eye on things



A pocket watch movement



the 1890s that he has repaired are still going strong so he was confident that whatever was wrong with it could be fixed.

It all looked positive but Reg didn't hear anything further, so in June he called up to say he was going to a swap meet in Pleasant Point and could look in at it then.

He got a call back, saying his visit

couldn't be accommodated at short notice. "I was told it was an OSH matter; I might fall down the steps. I might be getting on but I'm not that bad yet," said Reg.

He is still waiting to hear when an official visit might be arranged.

As Reg said, like many watchmakers of his era he is getting on but he isn't yet winding down. 🏠

“Clocks from the 1890s that he has repaired are still going strong so he was confident that whatever was wrong with it could be fixed”

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THE FOURTH ESTATE

Any threat to freedom of the press is a threat to democracy

By Jude Woodside

I was shocked to hear that Julian Assange is to be deported to the US to face that country's particularly unsympathetic form of justice. In the first place, Julian is not American; he is an Australian journalist, and he has been persecuted relentlessly for more than a decade for doing what journalists should do: speaking truth to power. How would you feel if it was John Campbell?

Julian Assange had the temerity to publish material that exposed the US in undertaking war crimes. If he had done so in Russia, China, Turkey, Hungary, or any of the other myriad autocratic states, we would condemn his treatment loudly. But because the US is the US, we stay mute.

This is a bad outcome for freedom of the press. Silencing and intimidating the press, and making journalists conform, is the first step in any autocratic regime and it signals the end of your own rights and freedoms.

It is the job of the press to hold governments and those in public power to account. To this end, journalists can protect their sources and they have a certain licence to question and even cajole those in power.

Some obligations, of course

They do have obligations, however, and these include being able to substantiate their arguments and accusations, being as objective as possible, and staying neutral. These last two have lately become almost optional, especially under a certain well-known former Australian magnate.

I used to be an avid newspaper reader; nowadays, I am content to read my local country-town paper. The rest of my news I garner from online sources such as the *New York Post*, *The Washington Post*, *The Guardian*, *Wired*, *New Scientist*, *Al Jazeera*, *Crikey*, and sundry other sources that I regard as relatively free of obnoxious ideology. Nowadays, it seems that the news in newspapers and commercial TV is little more than PR, with the odd plane crash.

I spent my formative years working in Australia for the ABC, in television news and documentaries. It was a great education and a fantastic way to see a country. I still reflect fondly on that time, not least because I have long since stopped watching television at all.

At the time, the ABC produced 80 per cent of its own content, including

news, documentaries, children's programmes, drama, and comedy shows. The ABC was beloved by the general population because it told their stories; they could see themselves in its content. It was also the most trusted news outlet, and it did its bit to keep the politicians honest.

Exposing corruption

During my time there at least two state governments were exposed for corruption, and numerous individuals, both in corporate and public life, were made to answer for their transgressions. We worked without fear or favour, and prided ourselves on being impartial.

Unlike here, the ABC carries no commercial content so it can't be said to be a competitor for the advertising dollar. It covered both television and radio, and was also responsible for seven symphony orchestras. I bring this up because of the impending amalgamation of TVNZ and RNZ. It concerns me because the government seems intent on blending water and oil here.

A commercial-free entity such as RNZ cannot exist comfortably alongside a totally commercial one like TVNZ. Try though it might, it would be impossible to prevent commercial concerns intruding into news coverage, and with it the inevitable political interference.

Our national newspapers fill their pages with fewer in-depth articles and more 'opinion pieces' that read like thinly disguised talking points for political parties. TV current affairs is actually hosted now by comedians, and is regarded as entertainment! There is no longer any cogent regular analysis of policy, without which we end up with dog whistles from the fringes and outright lies passed off as fact, concocted in the PR machines that append to political parties of every stripe.

Where do we get our impartial news now? That is no way to conduct a democracy. 🇳🇿





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