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WE ALL NEED A GOOD PLAN

A friend of mine is a few years away from retiring and is unsure of what he will do once he stops work. Like most of us, he has worked all his life and is ready to take it easy. However, he is in a bit of a pickle as to what he will do with the spare time. The only pastime he could come up with to fill his days once he stops work was to donate his time and the skills of his current job to some worthy charity.

While this is admirable for sure, I felt somewhat sad for him that his life was mostly about work. He is not a dull bloke by any stretch, but the old adage 'all work and no play' came to mind. While that's certainly not applicable to him, it possibly could have turned out that way.

In our chat, he said to me, "What will you do when you retire; how will you fill your time?"

This was something I hadn't worried too much about, as it's far enough away for it not to be uppermost in my mind, but it was a good exercise for me. What do I enjoy doing, and how will I fill my days with productivity, activities, and joy?

Well, my thoughts went straight to my workshop, of course, and all those projects that I haven't had time to undertake. Some of my tools never get enough use, and one project has been waiting for more than 25 years — crickey! That's a bit excessive.

My thoughts then turned to my other interests, and I listed them in my mind. There were at least three that I truly enjoy, and I can't wait to spend more time enjoying them. I play sport regularly, and kinda get as much of that as I want, and, of course, exercise is always there. That is such a demanding master but I do sort of enjoy it. Then there's travel, of course, and this and that and then there's …

It was with some relief that I realised I would not be short of fun when the time comes, but I was mindful that I should not neglect these interests and that maybe I should gently build up the time I spend enjoying them to make the transition smooth. I must say, it was a good exercise and it gave me some comfort to know I would not need to spend my time contributing my skills to some poor unsuspecting publishing business.

One curly issue reared its head in my out-loud thinking, though. Some in my management team suggested that when that time comes we won't need a workshop, let alone a garage. Gulp! Does that mean I need plans B and C as well? Darn it, more planning!

Greg Vincent
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EVERY ISSUE

Liam Croft's HjálmrJárn Blades stand

CUTTING EDGE

The craft of blade-making is thought to date back to long before the emergence of modern humans; even today, both in New Zealand and throughout the world, blade-smiths still have a passion for this ancient tradition

By Jason Burgess
Photographs: Jason Burgess

The art of shaping blades is more than a utilitarian act; it is something of a primal impulse, one that predates our relocation from the cave.

Without some form of cutting edge, our ancestors would have struggled to hunt, fish, gather food, build homes, or even defend themselves. Down through the ages, we have used everything, from quartz, flint, pounamu, and obsidian to copper, bronze, iron, and titanium. Today, a worldwide profusion of cutlers, sheddies, and blacksmiths is once again heeding that ancient call: to perfect a version of our most important tool, the knife.

Those who are doing the forging, beating, and grinding in New Zealand are as diverse as the blade and handle shapes they produce. There are teachers and nurses; chefs, lawyers, and engineers; and some who are not yet tertiary students. One thing all makers, suppliers, and even knife importers have in common is their passion for the art and craft of knife-making, coupled with a collective sense of support that they get from being a part of the wider community. ▶

Enjoying the show

Positive impact

Perhaps the most positive impact on the local knife community has been the influence of resident South Africans. One might be forgiven for thinking that anyone brought up in rural Africa was born with a knife in their hand. Most have grown up with cutting utensils from very early ages. The South Africa effect — in both craftsmanship and styles — has been keenly subsumed by Kiwi makers.

Terry Finney of Knives4Africa admits he was a bit of a 'shed hack' when he made knives back in Africa. Now, as a "purveyor of fine steel", he reckons he knows what it takes to make a great knife. Terry represents some of Africa's top cutlers internationally and believes the quality here is as good as anywhere.

"A good portion of makers here could compete happily at Atlanta [Blade Show Atlanta, Georgia, US]," he says. "Knife-making is an art form, with a science behind it. The better knife-makers understand the science. It takes time to get to that point — usually a five- to seven-year journey."

A flourishing fraternity

As the knife-making fraternity flourishes, so too do the lines of enquiry. While hunting and kitchen work are the mainstay for many makers

Historical fantasy, medieval combat re-enactments, and a revival of all things Viking have given rise to a new wave of blade-makers, who have a bent for refashioning, modernising, or recreating the traditions and designs of the ancients

Caden Bostic's Nedfly Knives display

here, historical fantasy, medieval combat re-enactments, and a revival of all things Viking have given rise to a new wave of blade-makers, who have a bent for refashioning, modernising, or recreating the traditions and designs of the ancients. Others are reconnecting with their personal histories, be that updating Māori weaponry with contemporary materials or striving for the finesse of the *sgian dubh* (pronounced 'sken-doo'). Some take their cues from science fiction.

Former chef Blair Strong, whose company WithKnives imports hand-forged Japanese blades, was blown away with both the response to his display at The Auckland Blade Show 2022 and the calibre of the show in general.

"I was surprised by the quantity and quality of knives; it is great and some are amazing," Blair says. "It is good to see people making proper knives with really good profiles — functional pieces of art."

The challenge

The internet has played a huge role in the renaissance of the knife arts. How-to videos on YouTube have been instrumental in kick-starting more than a few new makers, with social media helping to grow and develop connections and markets domestically and internationally. The reality TV series *Forged in Fire* has also inspired many novice makers.

For those who have followed more conventional routes to making, three books often pop up in conversations: *How to Make Knives*, by Richard Barney and Robert Loveless; *The Tactical Folding Knife: A Study of the Anatomy and Construction of the Liner-Locked Folder*, by Bob Terzuola; and Wayne Goddard's *$50 Knife Shop*.

Checking the details

No matter how they arrived at the craft, the biggest draw for most makers is the challenge of mastering the multitude of skills required to construct and sheath a great blade. From design and physical manufacture to understanding heat treatments, metallurgy, carving, polishing, and leather-work, there is much to learn. Some prefer fixed blades; others folders. Then there are the finishing touches. From rustic pieces that obviously reflect their composite — sometimes ▶

Simon Walker and Justin Williams head one wall of makers' stands

salvaged — source materials to the fine-tuned and ornately engraved; from everyday carries to Damascus art knives and mirror polishes, skill sets are matched by imagination.

A community

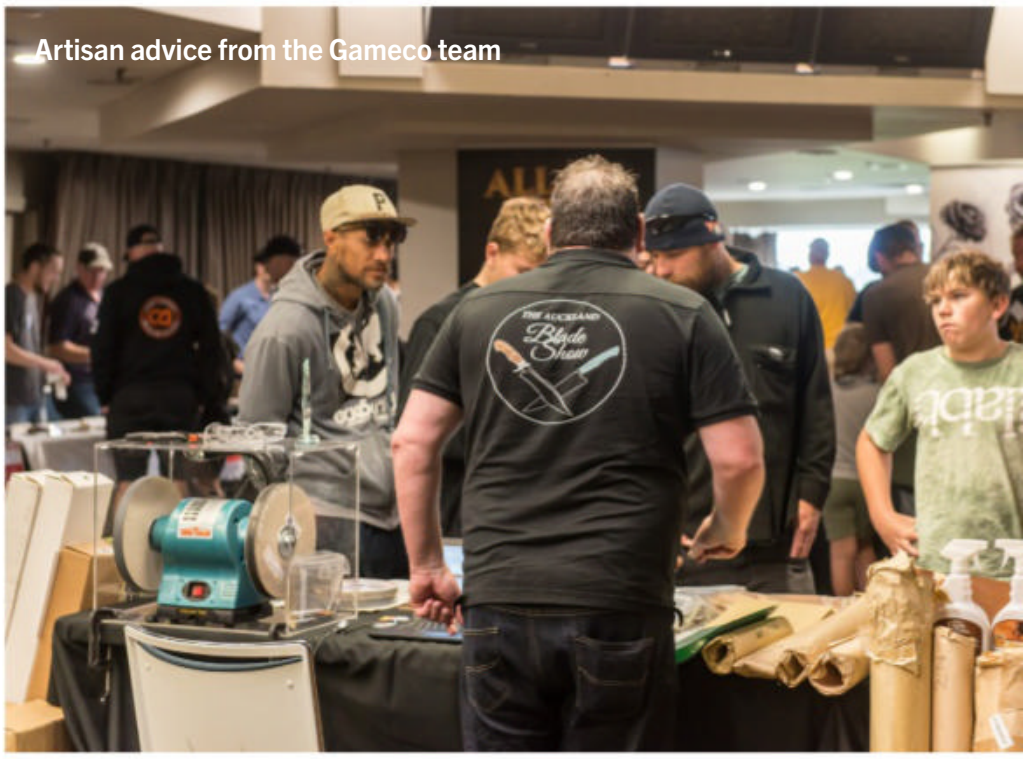
Visiting maker Francois Mazieres and partner Annieka Skinner are Yandiwa, from Australia. The couple were not only impressed with the warmth of the Kiwi community at The Auckland Blade Show 2022, but also by the overall excellence of the knives on display. They are currently tuning up their designs for judging with the American Bladesmith Society at Blade Show Atlanta 2023.

Francois best sums up the knife-makers' ethos with some advice he received from Jackson Rumble: "He said, 'Show people what you can do by putting yourself into what you are making. You have to think about what you want to make and how you are going to make it; to tell that story about who you are.'"

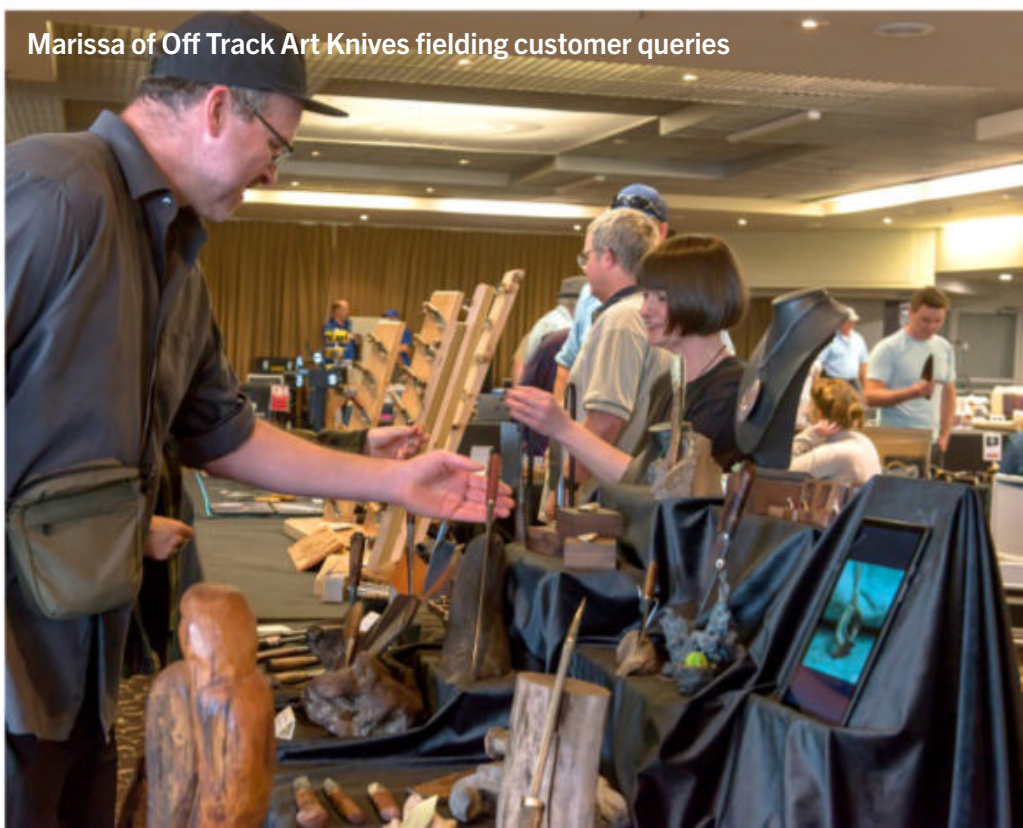
In the following section, we meet a range of contemporary knife-makers from across the country. Some may be familiar to readers of *The Shed*; others are relatively new to their craft. In all of them, there lies something of that primeval compulsion to be doing purposeful things with one's hands. In this case, it is making beautiful cutlery that will stand the test of time. ▶

Fans of HjálmrJárn Blades

Bruce Stuart's Lost Arts stand



Artisan advice from the Gameco team



Marissa of Off Track Art Knives fielding customer queries

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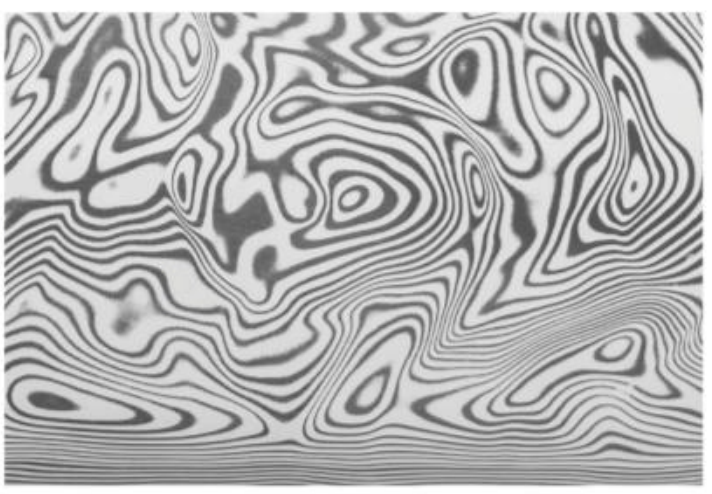

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Colin Nicol

CNi Knives // Tapanui, Southland

When Colin snapped his expensive Puma knife on a hunting trip in the Kaimanawas in the 1980s, he decided to make his own replacement.

"I said it can't be too hard — famous last words!"

Colin's first knife was cut from an old saw blade; his second he made for cutting his wedding cake — it was fashioned from an old file.

"It took another 20 years to get to a place where I was really happy," he reckons.

Colin is a science and technology teacher, working as a knife-maker in his spare time. He prefers to use a select few steels to get the optimum result every time. He also forges Damascus. He admits to often destroying blades while doing flex tests just to see if he is on the right track.

"I think that is quite important. The greatest learning is, I haven't stopped learning."

Colin is drawn to ergonomic and functional pieces, ranging from chef knives, cleavers, and steels to large blades and daggers. His point of difference is the dovetail bolsters that feature on most of his knives.

The first coat of oil on his timber handles brings Colin the greatest pleasure: "It's magic — an explosion of colour, figurations, and shapes."

The best part, though, is, "When someone comes back to you and says, 'You know that knife I got from you X years ago, I've passed it on to my son.' Now, that is pretty cool."

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Steve Martin

Martin Custom Knives // Nelson region

For Steve, at the age of 14, an article in *Australian Archery Action* magazine on how to make a hunting knife not only got him "hooked on knives" but also interested in metallurgy, which then led to a career in mechanical engineering.

He began making knives in earnest as a stay-at-home dad.

"I designed and built all my machinery — heat-treatment equipment, furnace, buffing machine, two grinders, and everything in between."

Steve still has his first self-built Loveless-style blade.

"I look at it now; it's a brick."

The heat-treatment process is the area he loves most: "I spend days doing trials and tests to get the best performance out of every different steel I use."

Sweeping grind lines are Steve's signature.

"It takes many years to achieve; it's not easy — lots of minute hand movements, twisting it slightly as you go."

With Steve's knives, "Guys can go into the bush and [deal with] six deer and seven pigs, and still shave their arm."

As well as hunting blades, he crafts Western and Japanese culinary styles plus light industrial engineering blades and specialist laboratory knives for food quality assurance testing. He's given up his "real job" to pursue blade-making full time.

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Stuart Johnson

SJ Johnson Knives
Havelock, Marlborough Sounds

Clean, futuristic designs, precision blades, and signature stone handles set Stuart's kitchen knives apart. He began making knives three years ago and says that he has never made two knives the same.

"I always try to upgrade the design every time; keep them simple and clean looking — nothing too flamboyant; simple designs that work well."

Stuart's first knife memory is of a handed-down pocket knife from his grandfather. He bought another pocket knife during his engineering apprenticeship and loved, "the way it worked; the locking mechanisms; the details — a lot of pieces coming together to make a product".

As soon as Stuart learned about heat treating, he reckoned the bug had bitten and the urge to start making knives was locked in.

Stuart works patiently and methodically, taking extra time to finish his creations by hand.

"I like the handwork; the files, the stones, the hand sanding. Sometimes knives can take six months to come together, to find the right rock to put on the handle."

In the end, perseverance pays off. "I make lifetime tools which are a pleasure to use, so I like seeing things being used. When they come back for sharpening after hard use, I enjoy that."

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Hugo Kappes

Centurion Knife Works
Rukuhia, Ōhaupō, Waikato

Some ancient blade-smithing spirit courses through Hugo's DNA. As a boy growing up in Canada, his birthday treats always meant visiting the museum to see the collections of ancient swords, knives, and armour. At home, he was constantly making "lots of wooden swords, all with metal guards".

After serving a sheet-metal apprenticeship, Hugo moved into stainless-steel fabrication for the biotech industry and became a master polisher — skills he later harnessed for his own business: custom-building motorcycle mufflers and professional cookware.

Burnout led Hugo back to sword-play. He got himself a smaller workshop, built a forge, and reset himself as a blade-smith — a whole new area of metalwork. His virtuosity with stainless steel translated well to forge work, as did the polishing, but, "I had to learn a whole new set of skills. I had to learn about metallurgy and heat treating and develop a style. Now I can take it, beat it, move it, shape it, squash it; it's pretty awesome."

Everything Hugo makes is hand ground, with overt historical references.

He explains, "[I still get] a buzz out of getting a good polish on and I enjoy curves and making things that flow and are aesthetically pleasing. Big knives are more fun than small knives; swords are more fun than big knives; and axes are work but a lot of fun. I like making things that appeal to my imagination. I try to stretch my abilities on every new project; to conquer something new is quite a challenge. If you can amaze or surprise yourself with something you have made, then mission accomplished." ▶

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Caleb Smit

Fehu Forge // Hikurangi, Northland

Caleb was brought up hunting and has carried a knife since he was a teen, but it was his love of competing in historical medieval battles that led him to knife-making.

Simply put, Caleb grew tired of snapping swords during full-armoured fights. He figured it would be "cheaper to go out the back and make a sword than pay a thousand dollars for a replacement". Once he learned to forge steel, "it steamrolled into knife-making".

He says, "My first blade was Damascus; I guess I like doing things no one should."

Caleb quit his building job to take up knife-making full time around the time that Covid hit — "as people started buying locally made". Suddenly, he was swamped with knife commissions, booked for two years in advance.

"I have only just got through my back orders," he says.

Caleb makes swords, maces, hammers, and armour as well as knives —"If it's forged, I can probably do it," he declares.

Distinctive, functional, and beautiful is how he describes his knife work, which he sells to collectors and users. He is also in a partnership with the New Zealand Barbecue Alliance, supplying a range of Japanese-style brisket slicers for its professional barbecue competitions.

"They sell faster than I can make them," he tells us.

Caleb also teaches knife-making and blade-smithing.

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AJ Prime

Prime Artisan Knives // Cable Bay, Te Tai Tokerau

Whether AJ is drawing from memories of his knife-carrying grandfather, reading sci-fi fantasy, watching the "university of YouTube", or reconnecting with his culture, his curiosity knows no bounds and inspiration reveals itself at every turn.

AJ has been knife-making full time for six years. He often uses reclaimed materials and historic techniques, but he says that nothing he does is planned.

"I don't repeat. I do like to do integral knives and Japanese-style kitchen knives. I prefer a downplayed aesthetic: the greens, the browns, natural patina. I'm not a fan of shiny."

AJ makes his own steel using Japanese *oroshigane* techniques and has recently begun integrating traditional Māori carving (whakairo) into his work. He produces a range of hunting, culinary, and utility knives but is currently exploring how early Māori might have used iron-making skills had they had the resources. He is schooling himself in the art of whakairo, and reimagining classic hand weaponry by way of the forge.

AJ reckons that there is no room for complacency in his knife-making practice, be that in a practical sense or in pushing personal boundaries. If there is one thing he has learned, he says, it is, "To cut myself some slack. My aspirations far exceed my abilities. I'm learning to take my time and be OK with some of the flaws."

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Benjamin Madden

Off Track Art Knives

Wairarapa

The natural world, historical blades, and a strong upcycling ethic inform Benjamin's work — those, and the activities of his jewellery-making partner Marissa, whom he credits with keeping a handle on his quality control.

Benjamin was raised hunting and fishing, and always carried pocket knives. However, it was bronze casting in a shed-built foundry that led him to knife-making.

"I realised I needed certain steel tools for specific jobs," he says.

Shaping casting tools quickly evolved into blade-making. Benjamin makes knives "from the ground up". Fossicking for salvaged steel and discarded timber is part of his practice, and pattern welding is the cornerstone of his MO.

"I layer up a bunch of steel-bent nails, wrought iron, bandsaw blades, 1084 steel — stuff that is already out there in the world; consolidated, folded, and usually made into hidden tang knives with an integral bolster."

Benjamin's handle inlays and details often feature cast metal and settings that include pounamu and semi-precious stones.

Experimentation and creativity are key: "I try not to repeat the same tricks; there are plenty more tricks to pull, and I'm always looking for new ones."

Benjamin advises novice makers not to try to make their best work first: "Add small bits to your repertoire each time, and it will grow really fast. The hardest thing is getting past your limitations."

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Michael Campbell

Gwaza Knives // Taupo

Knife-making is a restorative process for Michael. While he first tried making knives as a small boy, it took a bout of cancer as an adult to convince him to give it a go again.

"I got crook and went into my shed and started making knives. I haven't stopped since. To me, it is the therapy in making them rather than cost, value, or money earned."

Michael still works full time but says that blade-making keeps the stress levels down.

He credits fellow South African knife-maker Andre De Villiers as his inspiration: "I thought if he could, I could, because he was a farmer just like I was."

Since 2013, Michael has made more than 900 knives, selling them by word of mouth. Clean lines, blade patinas, and detailed 'file work' spines are a feature of his work. All his pins are in the shape of the Southern Cross; this celebrates his move to New Zealand. His specialities are bird and trout, hunting, and everyday carries.

Michael says, "There is a niche or market for everybody; don't be scared; do what you think works and stick by that."

Seeing a person use his knives rather than just collect them is what inspires Michael, as does the challenge of trying something new. He is working towards mastering a *sgian dubh* and quillon daggers but says that he needs to hone his skills a bit more. ▶

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David Tolmay

Tolmay Customs // Levin

Growing up in South Africa, David says carrying a knife was second nature — for camping and everyday uses. However, his obsession with blades really began after watching *Rambo* as a young boy. That led him to collect and buy knives at all sorts of price points. He played around with repairs and re-handling knives, but he says "the fascination for me was always in making them". Two years ago, he built his own forge and began making in earnest, working hard to turn his hobby into a revenue stream.

"[I make] what strikes my fancy. I stick to things that I know. I do a lot of cooking, so I make culinary knives and everyday carries," David says.

His preference is for "clean lines, what feels good in the hand and works well". As a known Jack of all trades, David also builds custom belt grinders for other knife-makers.

When asked who taught him, David's answer is, "Nobody and everybody. The knife-making community in New Zealand is sizeable; there are many people you can ask. Just get into it, pick up a piece of steel, and start."

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Nick Turner

Heorot Knives // West Melton, Canterbury

Metalwork is a central component of Nick's life. He is a fitter and turner by trade, a full-time knife-maker by choice, and an engineering teacher on the side.

For the past 30 years, Nick has had a deep involvement with medieval re-enactments and the associated armoury and weapons. His knife journey also began three decades ago, in a metalwork workshop that he was sharing with a mate who wanted to try making knives.

"We both got into it and decided it was fun."

Nick is known for his hunting and kitchen knives as well as historical blades, in both carbon steel and Damascus.

"Science is critical to what we do," he believes. "We are heat treating metals with well-established science and engineering behind it; it is not something you make up."

Fine lines, tasteful embellishments, and sculpted integral bolsters are hallmarks of Nick's work.

As humbling as knife-making can be, Nick says that he thrives on learning new techniques and the diverse range of skills required for this craft.

"There is no part of the process that I do not enjoy. As an engineer, I am driven to bring together materials and processes to create work that performs to its full potential. I also seek beauty in form, texture, and colour."

The best part of knife-making for Nick?

"Seeing the responses from people. They know what special looks and feels like in their hands. Every knife should be special."

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Eddie Gunter

Eddie Gunter Knives, // Auckland

There is something undeniably robust and tough about Eddie's finger-grip handles and stainless-steel eagle-head pommels. He specialises in working knives, skinners, and swords. His signature hollow grinds and mirror-polished blades set his bowie-knives and drop-point hunters apart.

Eddie has recently branched out into smaller drop-points — which he calls 'biltong' — and says they are proving very popular.

Eddie is a fitter and turner by day, but ever since building his first linisher in Durban over three decades ago, he has been making knives as a hobby.

"I made my first knife for my son," he says, "and sometimes I think I have given away more than I have sold. But I like to give to people who really appreciate them. There is a big difference between using a handcrafted knife and a store-bought one."

He continues to build his own grinders to ensure that he is using the best tools at his disposal. It is the challenge of consistently crafting quality knives that drives Eddie.

"Knife-making teaches you patience. It is easy to bugger them up. If you're not happy making knives then don't, because all you will be doing is spending all your time in the shed working!"

He believes there are some "bloody fantastic" knife-makers in New Zealand. "They are young, so they are only going to get better."

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Hayden Scott

Champion Knives // West Auckland

A 20-year, international kitchen career goes a long way in informing Hayden's one-of-a-kind culinary knives.

"Knife-making and cooking have parallels: following recipes, building up a knowledge base, and then running off recipes; finding new things and being creative."

Hayden reckons that he has had a knife in his hand since he was a young boy running around in rural South Otago. His 'first tool' was a white-handled Victory boning knife, which he used while working in a freezing works, sorting offal and trimming lambs.

A gift of a handmade Peter Lorimer knife changed Hayden's perspective of knives and ultimately sparked his curiosity about making them for himself.

"I was lucky enough to meet a knife-maker in Tasmania making Damascus knives at his forge in the forest. I thought I wanted to be a part of this. I didn't have an awareness of Damascus before that. This guy is making everything from nothing — it's incredible. I have been making my way towards that ever since," he says.

Hayden's knives tell the story of the materials they are made from and his love of nature; darkened blades contrasting with woodgrain handles.

"Knives are born from a really harsh environment, from the forge and the hammer. I try to reflect that in the finished product," he explains. ▶

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PRIZE-WINNER BEST HISTORICAL PIECE, THE AUCKLAND BLADE SHOW 2022

Liam Croft

HjálmrJárn Blades // Tinui, Wairarapa

Liam lives his passions, dividing his working life between making props for film and TV and crafting historically based art blades.

"I don't like modern stuff; super crisp lines, they're not my thing," he explains.

Norse mythology and perennial cutting edges are paramount to the success of his Viking-flavoured creations. Each of his highly detailed, pattern-welded swords, axes, knives, and spears is forged, heat treated, and crafted to perform.

In the tradition of the Vikings, patterns honouring nature are etched into his fullers and centre bars; visions of trees — roots, branches, even knots in the bark — and stars in the sky. Each sword is embellished with signature motifs, such as an ash tree; eagles, ravens, and dragons; even scenes of "Odin hanging himself, picking up his tiny runes as he dies".

Liam admits to being self-taught because he was "too shy to ask" other makers, and has been making seriously for the past 10 years.

"The first five," he says, "were just bashing."

Liam taught himself from books and the internet. His father's can-do practicality and skills were his primary influence; his chief inspiration, though, came from a handful of books, such as *Swords of the Viking Age* by Ian Peirce — "the best possible book for making Viking swords".

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Shaun Roodt

Ronin Knives // Auckland

PRIZE-WINNER BEST ART KNIFE, THE AUCKLAND BLADE SHOW 2022

From bowies with custom leather sheaths to hunters and art daggers, Shaun specialises in high-performance collectors' knives. He has been making seriously for nine years but has now set his sights set on achieving a 'journeyman smith' rating with the American Bladesmith Society. If successful, the recognition will place him among the cream of international blade-smiths. "It's a long journey," he admits. "You present five high-carbon knives to seven judges and all seven judges have to approve all of your knives."

Each knife will take Shaun about two months to make.

To call oneself a blade-smith, he says, involves "years of practice — and failures — to understand the fundamentals of steel and the forge; balance, functionality, and tip speed; heat treating high carbon steel; tempering and tension on the blade; distilled tapers; different sharpness points. All this knowledge only comes with time."

As remarkable as Shaun's blades are, getting the basics right comes first.

"A knife is a tool; functionality and purpose come before beauty, flair, and shiny stuff. As a blade-smith, you break a few knives as you work on them. Forging a knife can take half a day, before I put a basic edge on it; then you want to chop a two-by-four in half to see if your edge retention and hardening actually works. The pretty stuff comes later." ▶

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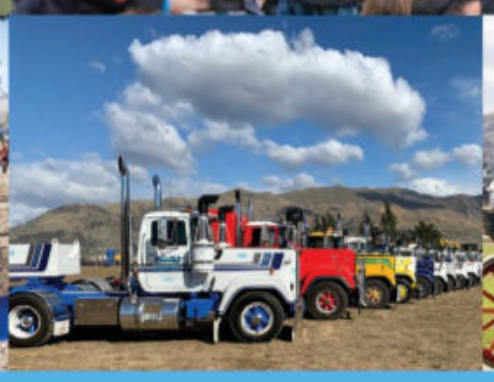

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Bruce Stuart

Lost Arts Knife-Making School // Clevedon, Auckland

It is the satisfaction that comes from achieving something difficult that keeps Bruce pushing himself into ever more complex blade-making challenges. That, and a keen interest in his Scottish heritage.

Bruce made first knife from a lawn-mower blade in his early teens — a *sgian dubh* using a flat file and vice.

"I was in a pipe band and I think the reason I wanted to be in a pipe band was simply so I could wear a *sgian dubh* and a dirk as part of the uniform."

A *sgian dubh*, with all the elaborate silver-work, is a complicated piece to pull off well — particularly, Bruce says, when you add "regimental patterns like Argyll and Southern Highlanders; Celtic dragons, and other motifs".

The Scottish thing kept going, and Bruce began making ad hoc *sgian dubhs* and dirks as gifts for friends.

Then, in 2005, Bruce did a hollow-grind workshop with Brent Sandow.

"That opened my eyes to the standard of finish you can get and what you can do with basic gear and a lot of attention to detail."

Now, as well as creating Scots-influenced pieces, Bruce makes culinary knives with a Japanese flavour, some hunters, and runs one-day knife-making workshops focused on building a knife rather than forging.

"We start with a piece of steel and go from there."

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Shane Minnear

Geraldine Forge and Blades // Geraldine, South Canterbury

Knife-making experiments began early for Shane. At age 11, he made his first fishing knife out of an old Wiltshire Stay Sharp blade tied to a piece of wooden broom handle, and he still owns it. Later, after grinding and shaping two slasher-blade knives with a flat file, he discovered David Boye's book *Step-by-Step Knifemaking: You Can Do It!* It was a massive influence.

For the past 20 years, Shane tells us, he has been indulging his knife-making skills, creating Japanese-style kitchen knives and forged chef knives in the *gyuto* style. He primarily forges pattern-welded (Damascus) blades with integral bolsters but also makes drop-point hunters and utilities. Lately, he has moved into doing all his own leather-work.

"I love knife-making because I am creating a tool that has a purpose. The mix of steel and timber is fascinating; the combination of rough forging followed by fine work; grinding, fitting, then the final polishing."

Shane runs a two-day knife-forging course and believes that "guiding others through the steps helps me as a knifemaker too".

His greatest knife-making pleasure is two-fold: "Pulling a blade out of the etchant, seeing what the pattern is, and matching the right customer with the right knife: someone who loves it, because I know it will give them joy using it for years to come — that makes me happy."

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Brent Sandow

Brent Sandow Knives // Nelson

With a background in industrial engineering and over three decades of knife-making experience, Brent makes blades that are collected all over the world. He is a regular exhibitor at the Blade Show in Atlanta — the largest knife show on the planet — a member of the prestigious Knifemakers' Guild of Southern Africa, and was the founder and former organiser of The Auckland Blade Show.

Brent made his first knife back in South Africa as a nipper, simply because he couldn't afford the ones that he saw in a gun store. These days, he is known primarily for his Loveless-style knives but has recently been experimenting with folders and art knives. He sees knife-making as an art form in its own right.

"There is the mechanical side as well as the art; blend the two together, and you get a great product whether you use synthetics, ivory, or woods."

Despite his success, he still enjoys the fundamentals of setting up a great workshop and is always looking for ways to speed up and refine his processes. He stresses the importance of having quality tools.

"German and British machines are poetry in motion."

However, he says his biggest thrill is getting feedback from the blokes who buy his knives.

As a teacher, Brent's advice to knife-making newbies is, "Open your ears and listen, then go and practise. Keep it basic; don't try and do fancy stuff to start with. Take each step at a time. If you are battling with something, speak to someone who knows how to do it. In this industry, people are very happy to help as long as you are willing to learn. And always be careful; all machines bite!"

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Geo Grobbelaar

Telumanis Blade & Tool // New Plymouth

A gift of a Swiss Army Knife at the age of eight was all the inspiration that Geo needed to set him on his knife-making path. He created his first knife at age 10 and today builds blades from scratch.

"Folding knives, preferably with locking blades — liner locks. I learned to make them with Eddie Scott [a member of the Knifemakers' Guild of Southern Africa]."

Geo also specialises in titanium anodizing and electro etching, as well as customising existing knives — Victorinox folders, Leatherman multi-tools, all kinds of production knives; whatever his client's needs.

He says that he is on a quest for simplicity, and he loves the R&D phase.

"Designing and making the prototype — that's the best part. It's the last 20 per cent of the knife that is important. You can get the blade straight but then there are the folding and locking mechanisms to consider."

For Geo, "Sharing within a community is gold; it means that everybody gets better."

Geo loves making tools, and advises knife-making neophytes that all one really needs are: "Motivation, a good piece of steel, a file, a hacksaw, and a drill press or hand drill — then you can make most things."

He also recommends reading *The Tactical Folding Knife: A Study of the Anatomy and Construction of the Liner-Locked Folder*, by Bob Terzuola, and *How to Make Knives*, by Richard Barney and Robert Loveless. ▶

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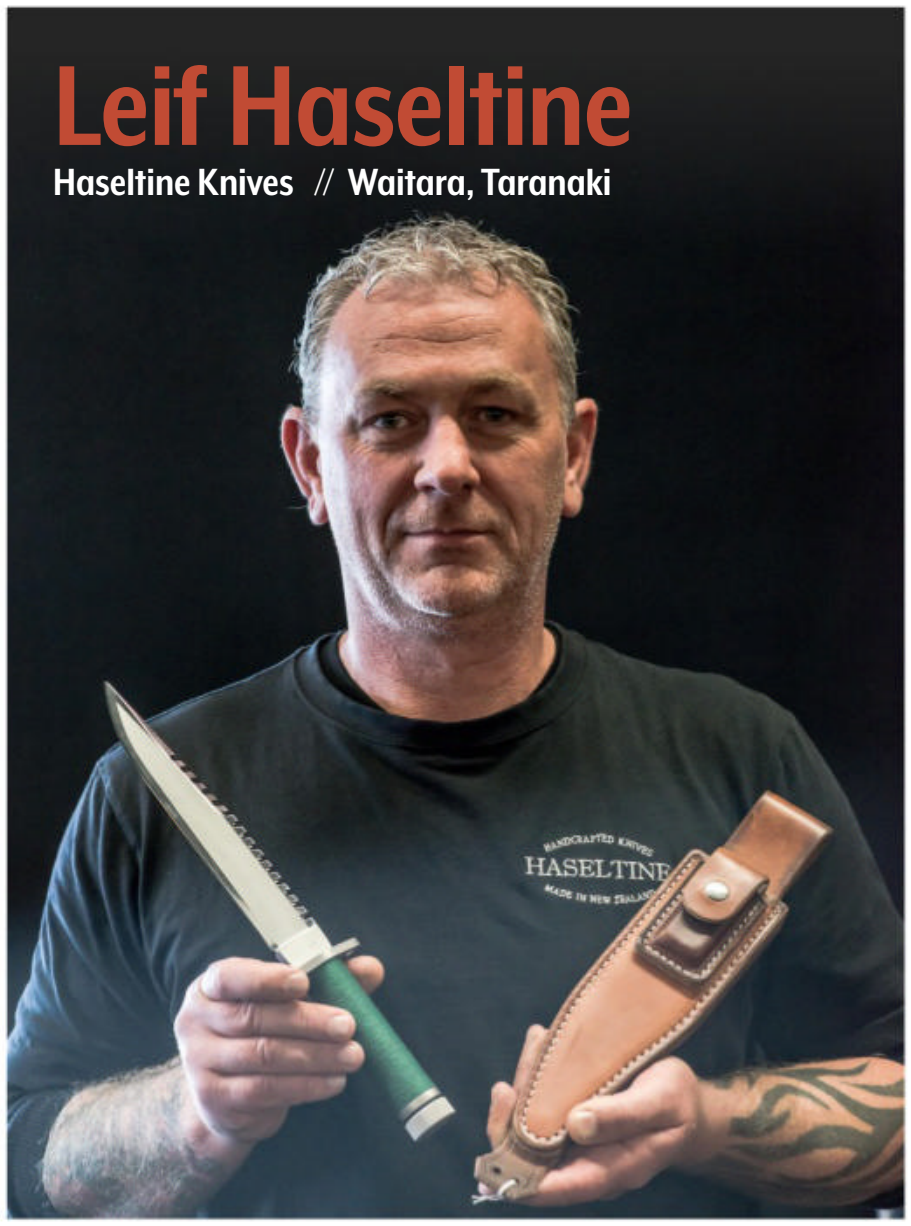
Leif Haseltine

Haseltine Knives // Waitara, Taranaki



The knife-wielding figure of Rambo made an indelible impression on Leif as a boy, but, growing up on a farm, he quickly learned that knives were not just for Hollywood heroes; they were an everyday practical tool. At the age of nine, Leif and his siblings were already turning out knives and swords in their father's workshop.

"Nothing fancy — carbon steel rubbish — but we made and used them."

About 15 years ago, Leif decided to take his knife-making to the next level: "I set up my shed as a knife-making shop and concentrated solely on producing knives."

Today, after some serious refinement, the Haseltine collection features six to eight Loveless-type patterns, made with hunting in mind.

Leif has produced his own signature blades, known as a 'Wappity', a speciality for deer hunting. He also makes a piggyback system — two knives in one sheath for sticking and general hunting use.

"I like keeping it simple and functional, what I would call working knives," he explains.

Leif makes knives to order, using stock removal as his preferred method. Some of his favourite materials are 01 tool steel and N690 stainless for blades, and Micarta for handles. He typically date stamps his blades, as it adds story to them.

"I get a buzz making something out of nothing, taking raw bits of material and making something functional that is going to outlast me," he says. "I enjoy making a knife for someone to use in their adventures. It is very satisfying. I like the fact that my knives go on adventures and people come back with stories to tell from their travels."

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Willie van Niekerk and Angela Martin

Kiwi Blade Knives // Auckland

Growing up on a farm in remote South Africa meant that Willie was handling knives by the age of five. His first blade was a little Okapi pocket knife, which he still owns today. At 16, a survival course taught him how to build blades by "hammering out a piece of flat bar by hand on top of an old railway track", and he has never looked back.

Later, after spending time with Japanese master knife-maker Kazuyuki Tanaka, Willie went 'free-hand'. Since then, he has earned a reputation for making quality blades, tools, stickers, and swords that come with a lifetime guarantee.

Kiwi Blade Knives, run with Angela, Willie's partner in life and business, is very much a family affair.

"We often come up with the designs and ideas together," says Angela.

Willie admits that, before meeting Angela, he "specialised in drab tactical knives", and credits her with inspiring him to push his colour and handle-shape boundaries.

The couple are focused on building community, not just among knife-makers but also on the market circuit and through their home-based knife school.

Angela sees knives as being as individual as people, and enjoys them as objects in their own right. "I love matching the right knife to the right person," she says.

To rookie blade-smiths, Willie gives this advice: "Love the process and not the outcome. Understand what you want to make. Align your processes and workshop accordingly. Make it cost-effective; choose the right steel. Keep practising, keep grinding, keep making sparks!"

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PRIZE-WINNER
BEST DETAILS,
THE AUCKLAND
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Liam Walle

Liam Valla Knives // Little Barrier Island

As young blade-smiths go, few come finer than Liam. Already, at 18 years old, he is cutting up the knife-maker community with his historically inspired and ornate work. At The Auckland Blade Show 2022, he took out the award for the Best Details and won the praise of many seasoned makers.

Liam says he aims, "To create works of art that cut as good as they look, something people will cherish for their lifetime."

Perhaps it is the splendid isolation of living on Little Barrier Island with his ecologist parents that gives him the necessary focus.

Liam combines a love of fantasy novels with his passion for making things with his hands to create his one-off art pieces. In a relatively short space of time, he has dedicated himself to learning, building, and refining his skills to create work that some makers might not attempt for years — think a hand-forged feather Damascus integral and an S-ground Damascus chef knife.

Liam's talent is mirrored by his ambition. He has his sights set on becoming a ranking member of the American Bladesmith Society in 2024, and his goal is "to create a legacy and be remembered as an artist of skill".

He is well on his way.

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Justin Williams

Judge Handmade Knives // Waitakere Ranges, Auckland

Knives have been a feature in Justin's life since his nan gifted him a little stag handle, fixed blade that belonged to his grandad.

"I lost it in the woods as a kid," he says, "but it was handed to me with a kind of reverence. 'You need to be responsible and careful with this, and care for it.' The message stuck with me."

At 14, Justin fashioned a folding knife for his dad from a nail he found in the garage. His father still has it. He says he has been making things since then.

"I would look at *Blade* magazine and *Knife Annual*, for makers who lived in the UK, and, as a kid, I would phone people up and ask them for advice."

Life took Justin in other directions, but four years ago he found that he had the time and space to get serious about his knives again. He says that he designs with performance in mind. Every detail is considered, from the thickness of the edge to how it feels in the hand. He makes razors, culinary knives, and tramping and travel pieces, all with the 'Judge' artistic spin.

"I have to scratch my creative itch. I like to explore techniques. I made my own heat-treating oven; work with differentially hardened steels; a little bit of forging but mostly stock removal."

Justin enjoys all the challenges of the many knife-making disciplines and is currently finessing his S-grinds, stabilising his own wood while also "going hard" into the leather craft.

"Knife-making has so many areas of manufacture; when one is not working well, I'll go and do something else." ▶

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PRIZE-WINNER
BEST FOLDER
AND BEST
IN SHOW,
THE AUCKLAND
BLADE SHOW
2022

Justin Stockbridge

All Fired Up // Waikato

As a long-time member of the medieval re-enactment community, Justin's first experience with blades was with swords not knives. As well as making swords for medieval combat, he has also amassed a sizeable collection of swords from other places.

"The first sword I made was a hunk of cold steel dressed up with an angle grinder," he says.

From there, he began his foray into metalwork with a $5 hammer and a $15 angle grinder from The Warehouse. He used a wok for a breastplate for his first piece of armour. Now, as a full-time blacksmith and metal-art creator, his shed features multiple coal and gas forges for heat treating, plus more than 150 different hammers for beating the various shapes necessary to manufacture his armour.

When Justin found himself sitting on a pile of by-products from armour making, he wondered what next to do.

"I ended up having all these little pieces of steel; what do you do with that? So, I started making roses."

Justin has now been dubbed the 'metal florist' and has been commissioned to decorate everything from funeral homes and private houses to weddings and public gatherings, with his "beautiful blooms that last forever".

Justin says that no matter whether he is forging roses, armour, fire pokers, blades, or other tools, "the making takes all my concentration — all my stresses disappear, it's a trance state, a nice feeling."

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Paul Mercer

Mercer Metal Craft & Edge Works // South Canterbury

Making is in Paul's blood. He grew up in a family of makers and, with his own agricultural, engineering, and building background, he has been tinkering with and transforming raw products — mostly wood and steel — into something usable for most of his life. His blacksmithing and knife-making journey began in late 2018 with hooks and decorative items, but he is best known for his hand-crafted axes, hatchets, knives, and hammers.

In his shed, Paul has engineered all his tools and designed and built his coal and gas forges, grinders, heat-treating oven, press, and power hammer. He handles the entire making process, from engineering, machining, and forging to grinding, heat treating, handle making, timber stabilising, and leather-work.

He says, "Nothing leaves the workshop unless I am completely happy with the finish, overall appearance, and the quality and longevity of materials."

Paul crafts a range of handles, using everything from G10, Micarta, and acrylic to native and introduced timbers, bone, horn, and antler — whatever is appropriate to serve the purpose and design of the tool.

He sees personal growth as an important factor for any maker, and is constantly experimenting with designs, techniques, and material processes on his quest "to find my own forging and knife-making style. I enjoy challenging myself and expanding my creativity while keeping the products practical and usable".

Paul believes handcrafted tools should "last for generations".

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Matt James

Damascus // Taupo

Before knives, Matt was very much on the tools, working first as a logger and then as a bush contractor. He has been making custom knives and Damascus steel for about 25 years. He enjoys challenging himself, furthering his skills and pushing the boundaries. Matt is self-taught, and he relied on instinct more than anything as he built his own workshop and forge.

"There were not a lot of books on the subject, and the internet was not the fantastic resource it is today."

From there, he started experimenting and developing the skills necessary to forge award-winning knives and Damascus steel.

Matt specialises in 'integrals', where both the blade and the bolster of the handle are forged, machined, and ground from a single piece of steel. It is a technique that demands much from the maker, so mastering the art of forging was top priority for Matt, particularly for proficiency in making Damascus and achieving a level of expertise that earned him a place with the Australian Knifemakers Guild for 10 years (no longer available to Kiwi makers).

Matt creates everything from Scottish dirks, daggers, halberds, and hunting knives to kitchen/chef knives, tomahawks, and axes. He reckons the joys of knife-making are twofold. One is the "amazing cross-section of people" he meets. The other is in the art of blending materials to make a knife.

"In essence, a knife need only be a sharp blade and a basic handle, but we take them to astounding levels of complexity," he explains. "It's interesting to look at work done hundreds of years ago, to appreciate what those craftsmen achieved with so little technology."

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Tony Pidgeon

Southern Alps Trophy Hunting NZ Ltd // Geraldine

If anybody knows what it takes to make a quality hunting knife, Tony is your man. This once former craftsman plumber now works in the deer industry, as well as running his own Southern Alps trophy-hunting operation — a personalised hunting and mountain-guide service — through the mainland. He is a skilled and passionate hunter with more than 30 years of trophy-hunting experience behind him.

Tony began making knives circa 2018 because he struggled to find a practical, well-designed antler-handled knife for hunting. He says that he has a passion for functional tools, and his work "is backed for life and built to perform". He makes hard-working beautiful knives from high-carbon steels and stainless blade steel with locally grown antler handles — think sambar, elk, and red deer. He says only five per cent of his antler stock makes the grade.

As well as building his own range of hunters, Tony cuts and supplies New Zealand walnut gun-stock blanks, walnut knife blocks, and a wide range of antler-knife-handle supplies to other makers. His mission is to make knives that will serve a hunter or outdoors person for a lifetime of adventures. ▶

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Marcos Doran

Custom Knife Worx // Papatoetoe, Auckland

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Marcos's fascination with blades began at an early age when he was gifted a pocket knife by his father. Thereafter, Marcos's pocket money was saved for visits to the local sports stores to buy knives for his burgeoning collection. His playtime was spent making double-edged daggers from modified kitchen knives and cutting throwing stars from sheet metal.

"Ninjas were big at the time."

When, later, Marcos laid eyes on an old copy of *Knife Annual*, his world was opened to an encyclopaedic range of knife and sword designs.

In 2001, an article in a local rag alerted him to knife-maker Norman Sandow and the first Auckland Blade Show. A visit there left Marcos spellbound. He immediately jumped online and bought *How to Make Knives*, by Richard Barney and Robert Loveless, and Wayne Goddard's *$50 Knife Shop*. After some experimental knife-making, he built himself a belt grinder and says that he hasn't looked back. His first exhibition was at the blade show four years later.

Marcos has been making for 20 years now. His hunting and outdoor knives — Loveless classics, trailing points, and bowie styles — are his stock and trade, but he also turns out some fine everyday carries, fantasy, and art knives. Each of his Custom Knife Worx blades is made free-hand by the stock-removal method, one knife at a time. He enjoys adding details to simple functional pieces, and often works with scrimshaw and etching. His embellished handles and blades are becoming something of a signature.

As well as knives, Marcos makes his own machinery and equipment.

He says, "I like to be busy. Knife-making is what keeps my mind occupied, and there is always a reward in making something for someone and seeing the smile on their face."

Caden Bostic

Nedfly Knives // Wellington

Millennial knife-maker Caden Bostic was introduced to historical weaponry through gaming. Much of his self-education came from YouTube; his sources of inspiration found on Instagram and Pinterest. At the age of 15, he was given his first Uncle Henry folding knife. This triggered what he calls his "obsession with making knives and historical items".

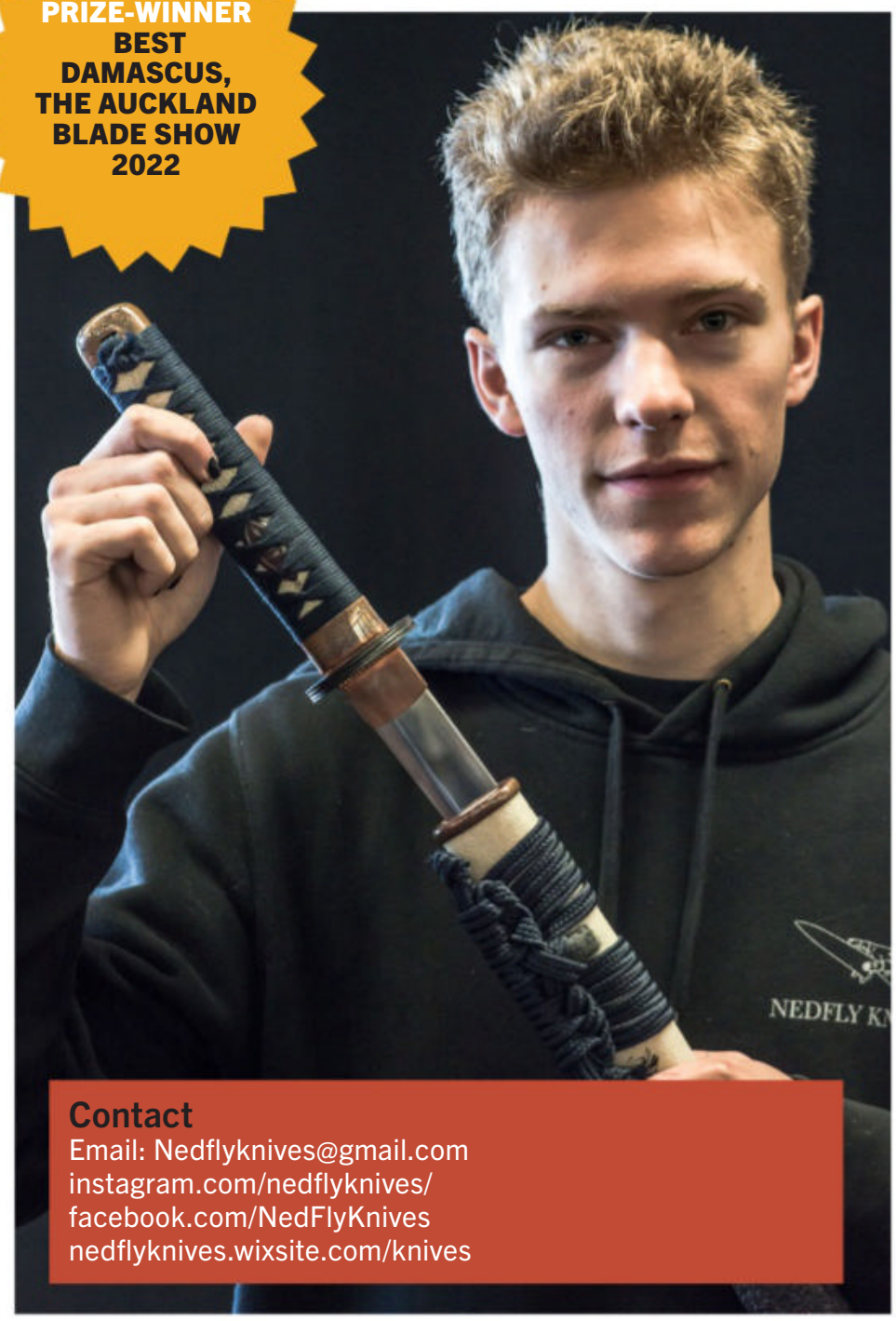
Caden's first knife effort was fashioned from an aluminium fire extinguisher and aluminium bottle that he found under his mum's house. Six years later, he is a part-time knife-making instructor while also working alongside Shea and Lena Stackhouse of Stackhouse Knives in Wellington.

"They have been a massive help in my journey," he says. "Skye Eilers [Auckland Blade Show host] has taught me a lot too."

While historic replicas and heritage designs really engage Caden, he can turn his hand to pretty much anything — kitchen knives, swords, axes, hammers, and folding knives. His replica World War II British Army daggers are in hot demand with collectors, and recently he built a *wakizashi* — a 16th-century samurai's auxiliary sword — as a study of the construction of Japanese swords. As he dives deeper into their construction, he aims to make the steel for the next *wakizashi* himself.

Knife-making is a form of time travel for Caden: "With the daggers and swords, I go through a process of understanding the decisions that were made in history and why they were made. I feel what all the soldiers felt. I understand why things were done the way they were. Every object has a deep back story." ▶

PRIZE-WINNER BEST DAMASCUS, THE AUCKLAND BLADE SHOW 2022



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Tyler Ackland

Tyler Ackland Knives // Little River, Christchurch

Part-time blade-maker Tyler Ackland discovered his passion for metalworking on a pre-trade collision-repair course. After the course finished, panel beating held no appeal; instead, Tyler had a hankering to create things that would function as well as look good. He admits that his first knife foray was less than successful. He watched some YouTube videos and thought he'd give it a shot.

"I tried to do a hidden tang on a short little *nakiri* [Japanese chef's knife]. It's a horrible little thing — doesn't cut carrots or anything like that — but after that experience, I dived into this world, watching Alec Steele and Will Stelter, and it has all exploded since then."

Tyler has been crafting knives for around five years, with a focus on culinary knives — "But I will try anything; I can't help myself."

He reckons that it was slow going at the start. However, when he began seeking critiques and mentorship, everything changed for the better.

"It's a continual learning experience, and this is an amazing community. People are really happy to teach the young guys; no arrogance — people share information willingly. It's awesome."

Process is what drives Tyler; researching and refining. He admits to sometimes working slowly because he is enjoying the process so much.

"The forging is great; I love it. When I sell a knife, it reaffirms that I am heading in the right direction — and people will have a knife that will last a lifetime."

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Stu Lind

Rule Nine Knives // Halcombe, Manawatu-Whanganui

For Stu, crafting blades is as much a therapeutic journey as it is about passion. He says, "I love making knives. In my shop, I am the only one responsible for everything. I make all the knives; I forge everything. I make all the machines. I do the sharpening and the aftercare. When everything else sucks and feels out of control, I can control all of that."

He admits to being a Jack of all trades: "Dad had a garage full of tools. I used to modify cars and mini choppers. I can weld and fabricate — I call it 'fabricobbling'; I cobble stuff together. Part of knife-making is learning to use the proper tools; it envelops so many other skills."

Stu's knife-making journey began back in 2018, when he was skint and needed a Christmas present for his brother, who, like Stu, had used knives as tools from a very early age.

"I looked at YouTube and thought how hard can it be? That was a mistake. It was a horrible knife; a perfectly high-end prison shank, but a really bad knife." Stu's brother told him, "I don't care what anybody else gets; I got the best present."

"That was a cool feeling," Stu says.

From there, he was off down the rabbit hole, connecting and learning with other knife-makers while pushing his own technical and creative boundaries.

Crafting blades and handles has brought Stu peace and clarity in his life. He produces a range of work to meet a variety of budgets: simple working knives with native timbers and sleek fillet knives, all the way to World War II–inspired knives. He says, "There can be few things as satisfying as taking a big piece of steel and making it into a beautiful, usable thing."

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Richard van Dijk

Hoiho Forge // Motueka

Richard is one of the most accomplished and sought-after knife-makers in the country. As a goldsmith/jeweller first, his exquisitely crafted knives are collectors' pieces. He remembers receiving his first knife as a present from his grandfather at the age five or six, and says he always thought of knife-making as something he wanted to do.

"But I figured that nothing like that was possible because I was born too late. I chose the next best thing and became a goldsmith."

Richard completed his training in Holland in the late 1970s before immigrating to New Zealand. In 1980, he came across David Boye's book *Step-by-Step Knifemaking: You Can Do It*, which, he says, "Got me on track." He's been making knives on and off ever since.

In 1996, Richard met a blacksmith who showed him the basics of forge welding. This taught him how to make Damascus steel and take his craft to new levels.

"I enjoy the forging and making the Damascus. It is often a challenge; you are always finding something new — there is always a little bit of experimenting. I really enjoy the experimentation."

Around 2000, Richard decided to become a full-time knife-maker. He dabbles with all styles, from swords and tiny bird and trout knives to ceremonial blades like *sgian dubhs* (stocking knives) and Highland dirks. His skill sets are quickly evident, especially when designs call for diamond, ruby, silver, and 18-carat-gold embellishments or greenstone inlays.

Richard was 1 of 18 blade-smiths invited to make a sword for the *Masters of Fire* exhibition in Macau. He also made swords for *The Hobbit*. His eye for detail is a hallmark of his sought-after commissions.

These days, he has at least two years of commissioned work booked ahead, so he says, "I don't get to do as much as experimentation as I would like."

For those seeking an exacting yet humble mentor, Richard also offers knife-making and jewellery courses.

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Simon Walker

SGW Knives // West Auckland

For Simon, knife-making began because he could not afford to buy the knives that he wanted. He started by 'adapting' knives — regrinding blades and/or reshaping handles.

"I bought a knife-making book, but it was so far above my skill level it was almost useless to me, so I kept on playing."

He knew how to work wood, but the rest was trial and error.

"That was about 40 years ago — real low-key stuff. I'd make them and give them away, because I enjoyed doing it."

As a keen outdoorsman, Simon attended a Ray Mears survival course. When he spied Ray's knife — another priced beyond his reach — he went home and made his own version, which he still uses 27 years later. From there, he got more serious about the craft.

Simon likes to make knives to be used for bushcraft, camping, and survival — such as parangs, which are larger Malaysian-style knives similar to machetes. He also produces hunting knives to order.

"What I really enjoy is the constant learning and experimentation: getting my heat treatment correct, stabilising my own timbers, making my own mosaic pins. I turn my own bolts and try different leathers for my leather-work — to get a better product; I just want to improve."

Simon says, "My Wilderness Pro is where I'm at. It is quite technical, made from 5mm stock with a tapered tang from 5mm to 2.5mm but with a 3mm disco taper on the blade. To put both tapers on pushes your skills. You can't just scribe a straight line and grind the 5mm to 3mm bevel, because the height of the bevel changes; you have to actually do it by hand and eye."

When Simon gets enquiries for advice, he says, "Keep it simple. My three Fs: form, function, and finish. First, the design should be fit for purpose; when you move on to really good steel and a good grind, then you will have a really good tool that performs well. When the fit and finish are right, it should look like it is one piece. The finish shows the maker's intent to produce a high-quality product, but finish alone won't make the knife work." ▶

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Rick Jochem

RJ Knives // Palmerston North

When Rick started making knives, he just wanted to make a good hunter.

"When a mate kept grabbing mine, I decided to make him one so I could get my knife back. From there, things took off. I just wanted to keep making the next one better than the one I just made."

Rick started with basic tools, and credits Wayne Goddard's book *$50 Knife Shop* as being a great source for how to build a knife on a budget.

"Everything you need to get started."

Rick is a full-time agriculture teacher at Palmerston North Boys' High School. He says that, after doing "brain stuff" all day, being able to use his hands at the end of the day and see something he has made is rewarding.

He spreads his downtime between making knives, whakairo, hunting, and fly-fishing, and reckons his knives are made to "get blood on them. They are field tested and purposely made. If it is going to be used outdoors, then I get excited about it".

Rick is now applying his wood-carving skills to his handles — his favourite part of knife-making.

"Shaping a handle is a really organic process — repeatedly holding the knife to see how it feels, making adjustments until it feels right," he says.

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Skye Eilers

Skye Eilers Knives // West Auckland

Skye is an embodiment of blade-smithing's new wave. While he is committed to perfecting time-honoured crafts, he is equally dedicated to building an online community of fellow makers, while growing awareness of the craft and an audience of potential buyers.

He went professional in 2018 and sees knife-making as "one of the most multifaceted disciplines in the world — forging, metalwork, woodwork, metallurgy, jewellery techniques, engraving, hunting, and culinary knowledge. There's always more to learn. Being able to dedicate yourself with patience to every process is a challenge".

That challenge is not just with knives but on the business side too.

Skye's fascination with sharp things began at an early age in the UK, while he was studying Greek, Roman, and medieval history at primary school. His dad helped knock him up bows and arrows and wooden swords.

Then, when Skye arrived in New Zealand, he says, "I got very hands on [with] lots of crafts: wood carving, making, and also tying old kitchen-knife blades to wooden handles!"

When he realised that he was OK at making things, Skye tried his hand at swords but decided they were too hard. He then moved through a variety of knife styles before settling on chef knives.

"I don't hunt or have much use for general knives, but I love cooking, so the two passions combined well," he explains.

All Skye's blades begin life as hand-drawn designs and are crafted to last. Refined, classic lines are his hallmarks; performance and flow are his fundamentals. He says he works hard to produce captivating pieces "that grab people's attention immediately, and then blow them away when they use them".

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Lena and Shea Stackhouse

PRIZE-WINNER BEST CHEF KNIFE, THE AUCKLAND BLADE SHOW 2022

Stackhouse Knives // Upper Hutt, Wellington

With a passion for teaching and sharing knowledge, Shea and Lena Stackhouse not only combine their blade-smithing and carving skills to create unique artworks but are also building community. Together, they have been running Stackhouse Knives for the best part of five years, offering classes in knife-making, Damascus steel, blacksmithing, jewellery, and carving.

"We are full-time knife-makers. The classes started through our arts background and have become a key part of our business, centring on sharing knowledge and providing opportunities for people to learn and express themselves," says Shea.

The Stackhouse tagline is: "If you're not living on the edge, you're leading a dull life", and the work they create together pushes conventional boundaries. Lena specialises in art knives with a twist. She has been making for about 10 years and each knife is a combination of her carving and Shea's Damascus steel. Together they say, "Our work pushes the boundaries of a 'knife' form."

The handles Lena carves take the forms of insectoid and aquatic life. She is also known for creating small-scale sculptural objects.

Shea creates handmade Damascus cutlery, sculpture, and jewellery. His mother was a chef, so he was brought up around knives.

"From about 12 years old, I got really comfortable with a knife in my hand," he says. "We make lots of knives but my heart is in the kitchen. Cooking and chef knives are a reflection of the chef and prep work I used to do. It's the soul of my work."

You could call the pair the power couple of the New Zealand blade-maker scene. They are dedicated to the revival of blacksmithing and knife-making as well as creating tooling and equipment for the next generation of makers; supplying materials and curating a community site that hosts resources and helps makers connect.

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Simon Dobbie

ATE Knives // Auckland

Knife-making may be a recent pursuit for Simon but already he is earning his chops. Simon is a chef by trade, so he understands the qualities necessary for tools that can endure years of chopping, cutting, and dicing.

"I'm for function first — because I'm a chef, it's got to work — but if I have something in my hand every day then I want it to be beautiful. Achieving that as opposed to knowing, is the learning."

A shoulder replacement coupled with lockdown and a series of *Forged in Fire* convinced Simon to give knife-making a go.

"I thought, *I'll get bored for the next 12 months, what am I going to do?* I watched, and realised I didn't need a forge to make a knife, so off I went." Simon started with a grinder and $200 sander. At present, he is perfecting a range of chef's blades with a particular focus on paring knives because, "people really want the tomato knife that never blunts". He also has a thing for a good neck knife — he uses his every day.

"Knife-making," he says, "is art; it's attractive and the community is supportive. I'm addicted!"

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A perhaps above-average stall. Note the variety of well-presented tools and antique items. The two copper thermettes have had their paint removed and been polished. The gazebo is ready for bad weather — which didn't eventuate

LIFE RETURNS TO NORMAL

Canterbury swap meet comes out of hibernation

By Ritchie Wilson Photographs: Ritchie Wilson

After a two-year hiatus due to Covid-19, the Canterbury branch of the Vintage Car Club of New Zealand's (VCC) annual three-day swap meet was held at the beginning of October. The eagerly anticipated meet — advertised as "New Zealand's biggest garage sale" — took place at the club's large Cutler Park base, which is part of the McLeans Island Recreation Reserve in Christchurch.

Club captain Katryna Shaw estimates that 8000 people from all over New Zealand attended, with all 674 vendor sites being taken up. On the Saturday morning when *The Shed* attended, the enormous area of stalls was very busy, with items of all kinds being snapped up and throngs of car and bike enthusiasts crowding the walkways. The food vendors were being well patronised, with long queues at the ice cream vans. There was also a very large display of cars.

A Christchurch institution

The McLeans Island swap meet has been going for 45 years and varies from year to year. Some years the spring weather is poor and many site holders have tents, awnings, and gazebos to protect their offerings from rain; this year, the weather was perfect on all three days. Katryna thinks this undoubtedly boosted attendance and sales.

Among the many items of interest to be seen were the wonderful 'as-found' Ford Model T with homemade solid-rubber tyres — probably fitted during World War II, when tyres were hard to come by — and Peter Lynn's hot-air-engine-powered Stirling invalid carriage. Attracting interest from the ambitious were a couple of ancient sedan bodies with infinite possibilities.

> **Eight thousand people from all over New Zealand attended"**

A few years ago, a de Havilland Gipsy Major aero-engine, complete with propeller, mounted on the deck of a lorry, was among the items for sale; it was even given a demonstration run. There was nothing as terrifying as that on offer this year.

Typical stalls; a tiny fraction of the total

A bit of a trend

One trend in the world of vintage cars is the number of women in top car-club positions. *The Shed* spoke to Pat Bren, Vintage Austin Register president; Diane Quarrie, president of the VCC — both from Napier — and, of course, Katryna Shaw.

Almost every stall had some tools for sale; many vendors are tool specialists. A young fellow was observed buying a Record 75 Auto vice — the one with 5½-inch jaws, an adjustable base, and red paint — for $180. When congratulated on his purchase, he said that he was starting a workshop in his garage and wanted a big vice.

There were many woodworking tools for sale: planes, some rare; freshly sharpened brass-backed tenon saws; braces and bits; and lots of folding rules. Prices seemed reasonable. A number of stalls stocked kerosene-fuelled brass blow lamps in various sizes. Some were polished; most not.

Masks were conspicuous by their absence and there was an air of life returning to normal.

Part of the very large vehicle display. Stationary engines just visible in the background

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:*

Meet the amazing Kiwi motorbike builder Ken McIntosh

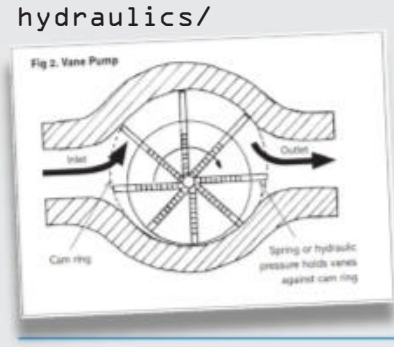
`the-shed.nz/classic-manx-norton-flourishes/`

See unpublished photos from our magazine features

`the-shed.nz/photo-galleries/`

Get a basic overview of how hydraulics work

`the-shed.nz/a-primer-in-hydraulics/`



Watch interviews with metal-shaping legend Steve Roberts

`the-shed.nz/videos-of-metal-shaping-and-motorbike-guru-steve-roberts/`

PAINTING TIPS FROM THE RESENE EXPERTS

So you're back into the swing of the year but perhaps didn't quite get all those projects finished that you had planned to do over the holidays. To help you get your decorating projects done, we've asked the Resene experts to share some of their top tips:

Break it up

The thought of painting a whole house can be a little daunting. Rather than try and tackle everything at once and end up with a muddle everywhere, break your project down into smaller parts, ideally to take a weekend or so. Then you can focus on finishing one part at a time before starting the next. Not only is it more motivating when you can get stuck in and finish in a couple of days, it also means that your home will be easier to live in while you work through the various stages.

A good place to start is an exterior housewash with Resene Paint Prep and Housewash and to treat mould with Resene Moss & Mould Killer. These will clean the surface and kill mould. You'll have an instantly cleaner surface so it will be easier to see any repairs needed before you start painting.

Plan your painting times

If you're painting in the warmer months it pays to start early, take a break in the hottest part of the day and then restart in the afternoon. This makes it easier to keep a wet edge on your paint and to avoid the harshest effects of the sun on your skin. If you're keen to decorate all day, have an interior project ready to do in the middle of the day – this might be cleaning or prepping a wall. In the cooler months the opposite applies. In winter you need to give the surface time to warm up before you start painting. And you need to stop early enough so the paint can dry before there is dew overnight.

Ace the additives

Our climate fluctuates from hot to cold and something in between.

To get the best out of your paint, make sure you are using the right additive for the season.

In winter, use Resene Wintergrade Additive to help your waterborne paint dry down to a super cool 3 degrees.

If there are light showers about, use Resene Umbrella Additive to give your paint early protection against the weather.

In summer, use Resene Hot Weather Additive to give you a longer wet edge in the hotter months so you have more time to paint before the paint dries.

Need help?

Ask a Resene Paint Expert
resene.co.nz/techexpert

Ask a Resene Colour Expert
resene.co.nz/colourexpert

View the huge range of Resene paints and wallpapers and get all the expert advice you need for your decorating projects at your local Resene ColorShop.

THAT'S A GOOD IDEA

LETTER OF THE MONTH

I saw an image of the MPCNC on your Mar.–Apr. 2022 cover. I am wondering where you got the files for the TFT case and the mount for it. I'm in the process of building one and like what you did.

Thanks,
Matthew Taylor

Hi Matthew,

You will enjoy using the router; it is a great little machine. Gavin Melville drew up the extra parts that we printed. He is happy to share the STL files with you if you contact him directly: Gavin.melville.nz@gmail.com
***The Shed* writer, Des Thompson**

KEEPING MY OLD DRILL PRESS ALIVE

I read your article on the restoration of an old Tanner drill press. I was given one by an older gentleman, and I would like to continue to use it, but the electric motor needs looking at. Would you know if there are any companies up in Auckland that deal with old machines of this kind? Sorry, such a random question, but I want to keep it alive; it's still in pretty good condition.

Much appreciated,
Peter Hansen

CRACKING GOOD IDEA

With the egg shortage, wouldn't it be a good time to publish instructions for an easy-to-build, efficient, and sturdy large chicken coop? It would add value to my subscription and would probably run very well in supermarkets, etc.

Cheers,
Benjamin Wolpert

Thanks for that idea, Benjamin; we'll run it past the editorial team and see if we can find someone to write a how-to on building a chook house. Ed.

CALLING ALL BONE CARVERS

I need information on what type of respirator I need for bone and antler carving. Please let me know where to find this information.

Thank you,
Lorena Roberts

LETTER OF THE MONTH PRIZE

Every issue, our Letter of the Month winner will receive a copy of *Best of Shed 1 & 2*. More top projects from 15 great years of *The Shed* magazine.

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

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The *Milford 20* sailing on the Avon/Heathcote rivers' estuary

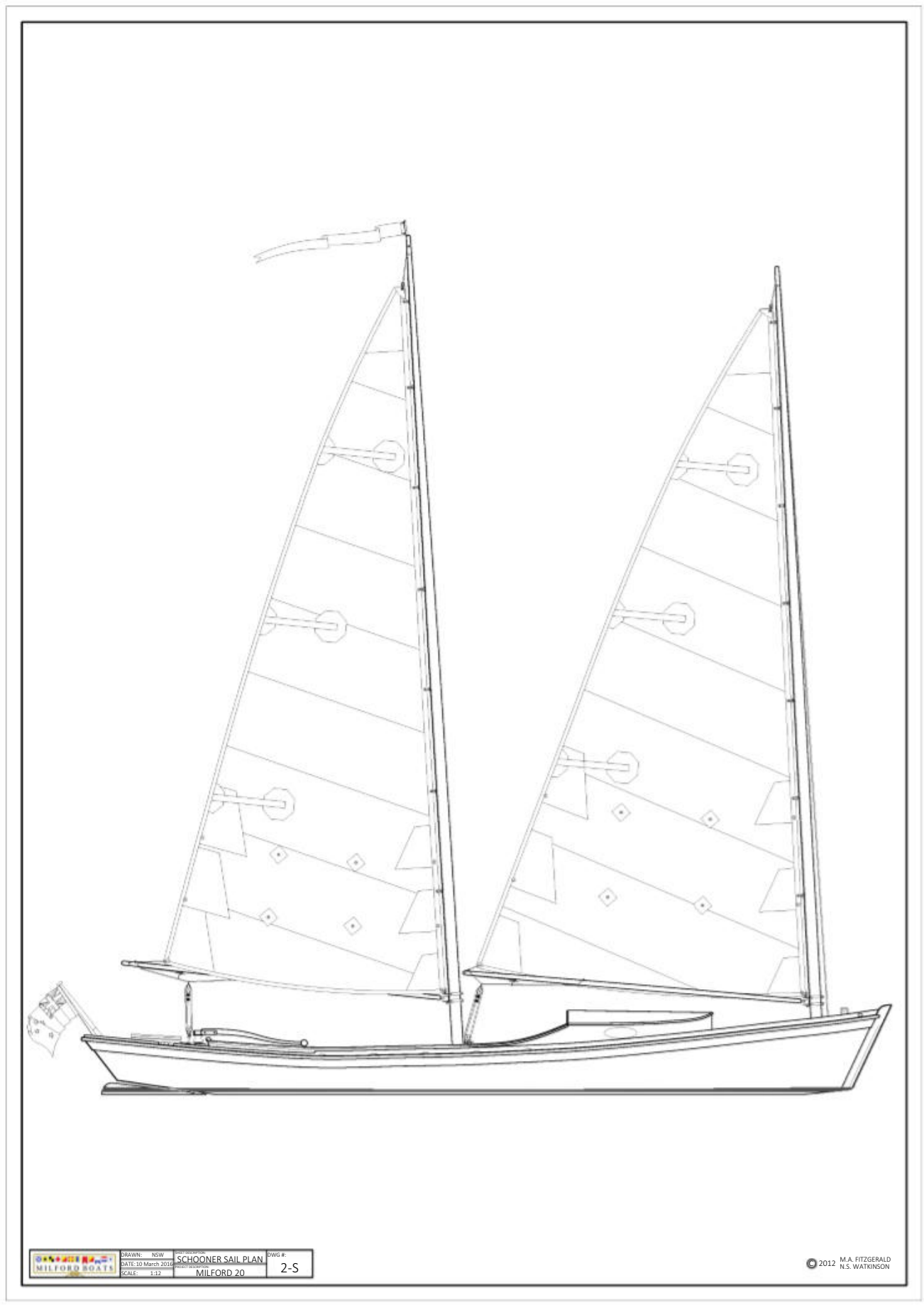
KIWI INGENUITY

A lifetime of technical innovation, experimentation, and creativity was jump-started by woodwork and metalwork lessons at intermediate school

By Ritchie Wilson
Photographs: Ritchie Wilson, Neville Watkinson, and Carolynn Watkinson
Drawings: Neville Watkinson

Neville Watkinson wanted to build a 'sharpie' — a shallow-draught sailing boat — and was impressed by the design of the sharpie ketch *Floridays* from the drawing board of well-known US designer Mark Fitzgerald, which he had seen on the internet.

Neville contacted Mark, who said that he didn't have comprehensive plans for the boat, as he had the only example, which he still owns, built 30 years before under his direct supervision. He had been contacted by a number of prospective builders over the years — including ones from this part of the world — who had been interested in purchasing plans, but it wasn't viable for a very busy designer to spend significant time on a design that was never going to be put into commercial production. He generously said that Neville was welcome to use his basic design and suggested some modifications that he thought would improve it. They agreed to split the copyright of the final design. ▶



Sail plan for the *Milford 20* sharpie schooner

A good boat on a perfect day

Frames erected on the strongback

After a couple of years of sailing *Polperro*, he had a good idea of what he liked in a boat and what he didn't

A passion for boats

Neville has been interested in boats since an early age. One of the first things he ever made was a cardboard model of Captain Joshua Slocum's 37-foot yawl *Spray* using the lines printed in Slocum's book *Sailing Alone Around the World*.

Neville has designed half a dozen small boats over the years, most of which existed only on paper. When he was the proprietor of a clothing company in Auckland, he owned the 5.5m keeler *Polperro*, which he extensively rebuilt. He replaced a couple of the hull's ribs, made a new keel, and recaulked and painted the kauri planking. He renewed all the rigging and recut the sails. After a couple of years of sailing *Polperro*, he had a good idea of what he liked in a boat and what he didn't.

Quake changes everything

Neville started out drawing up his version of the sharpie's plan using pencil and paper on a drawing board. At the time, he owned a joinery business in Christchurch, mainly making wooden kitchen items for the local restaurant trade: wooden spatulas; rolling pins; solid-wood chopping blocks; wooden pizza boards for the serving of pizzas; and the long-handled, wooden, shovel-like instruments — called 'peels' — for removing bread or pizzas from the oven.

The stern framing is covered in three layers of thin plywood

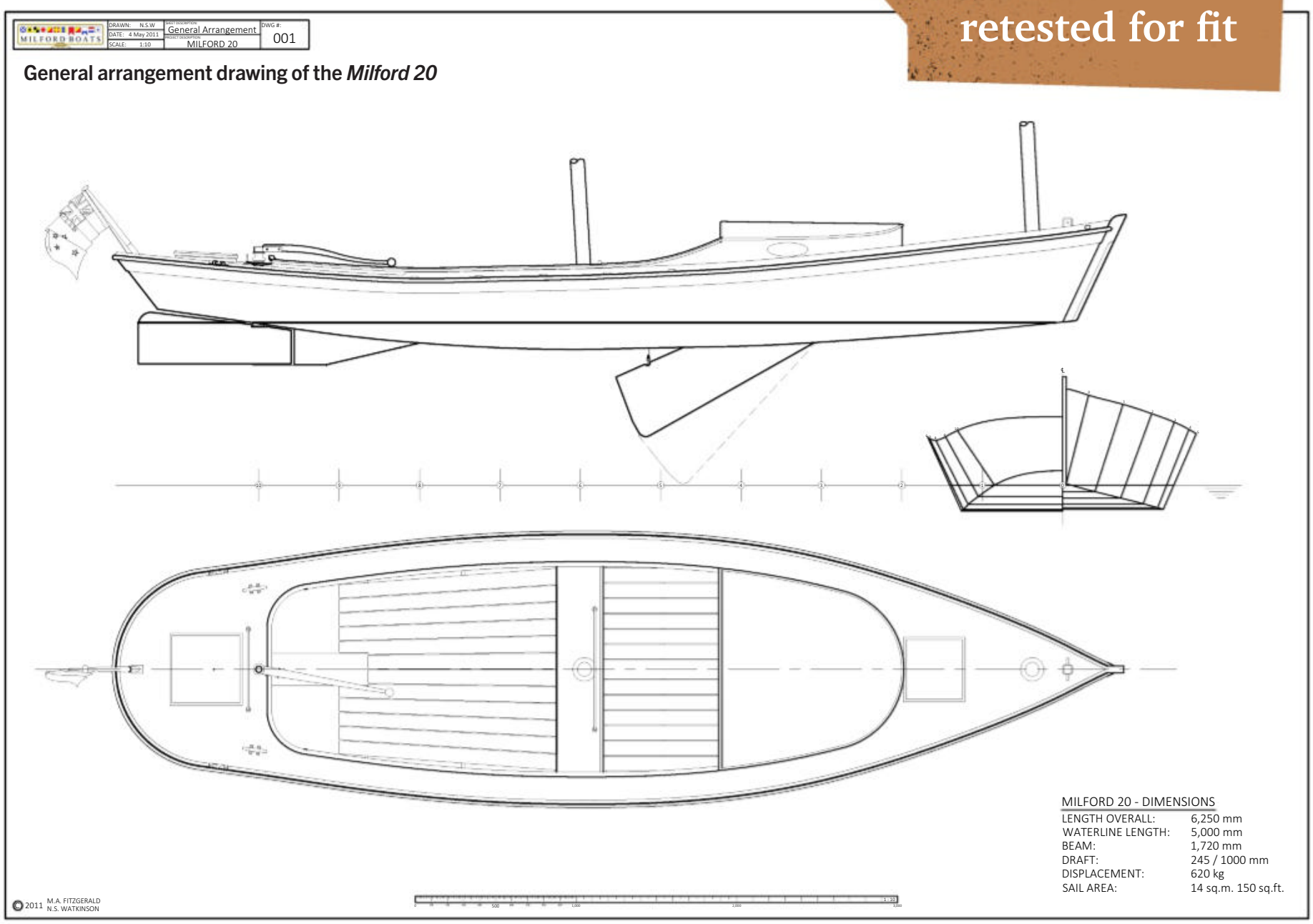
American oak stem and keel

It was quite a seasonal operation, and in the quiet months Neville could leave his staff to keep work ticking over while he devoted himself to other things — such as finishing the design of the *Milford 20* sharpie schooner. That was before the 2011 Christchurch earthquake.

After the comprehensively damaged central city was sealed off by the New Zealand Army — causing most of the city's eating houses to close down — Neville could see that his business was doomed. Before the sale of his premises was completed, he started building the *Milford 20* in the loft above the joinery workshop's office, despite the obvious limitations of the space.

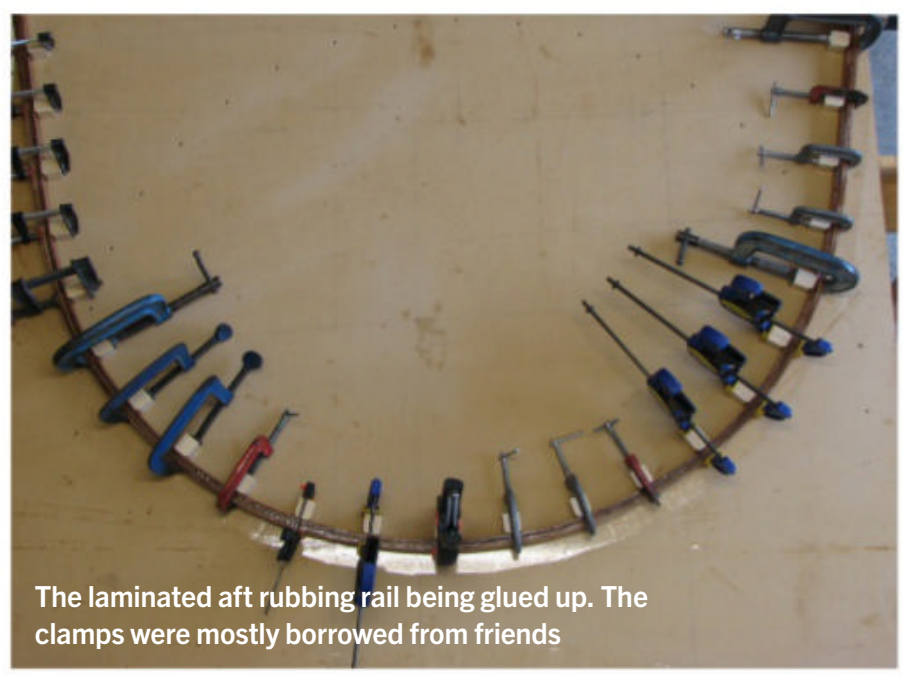
It was a square area a bit less than a couple of metres longer than the 6m completed hull and had restricted headroom. A staircase on one side provided access. The joinery machinery was at ground level, so components had to be taken up the stairs for a trial fitting and then down again to be adjusted before being taken up to the loft once more to be retested for fit — a process that might have to be repeated several times. The loft did get ample natural light from the large window in the building's end gable. ▶

Components had to be taken up the stairs for a trial fitting and then down again to be adjusted before being taken up to the loft once more to be retested for fit



General arrangement drawing of the *Milford 20*

The hull after being turned the right way up. The curved sections of the turning cradle that facilitated this can be seen



The laminated aft rubbing rail being glued up. The clamps were mostly borrowed from friends


Temporary platform to extend the loft


The rear trolley being removed after the stern is lifted

Removing the completed hull from the attic required the building of a platform

Building in a loft was challenging

The boat's ply bulkheads and sapele (African mahogany) frames were mounted upside down on a strongback, the heavy American white oak keel and stem timber were installed, 9mm marine-ply sides and bottom were attached, and the curvaceous canoe stern was formed by laminating three layers of 3mm ply. The hull was sheathed in Dynel — a woven polyester cloth that has very good abrasion resistance — embedded in epoxy resin.


The trailer being positioned


The platform being dismantled

The hull was then turned right side up — a decidedly tricky manoeuvre. Curved plywood shapes were attached to the hull, and a team of helpers rolled the hull over on to them. The forward deck of thin ply on Fijian kauri beams, the centreboard trunk, and the engine compartment were then installed.

The timbers used were mainly ones that Neville had used in his business and had in stock. There was, of course, a good selection of woodworking machinery available.

Removing the completed hull from the attic required the building of a platform sufficiently long for the hull to be pulled forward far enough to be attached to a gantry that ran along part of the building's ceiling. The hull was lifted, the temporary platform dismantled, and the hull lowered to stands on the building's floor. The heavy centreboard — partially wood and partially lead — was fitted from below and pulled into its case using a winch attached to the gantry. ▶

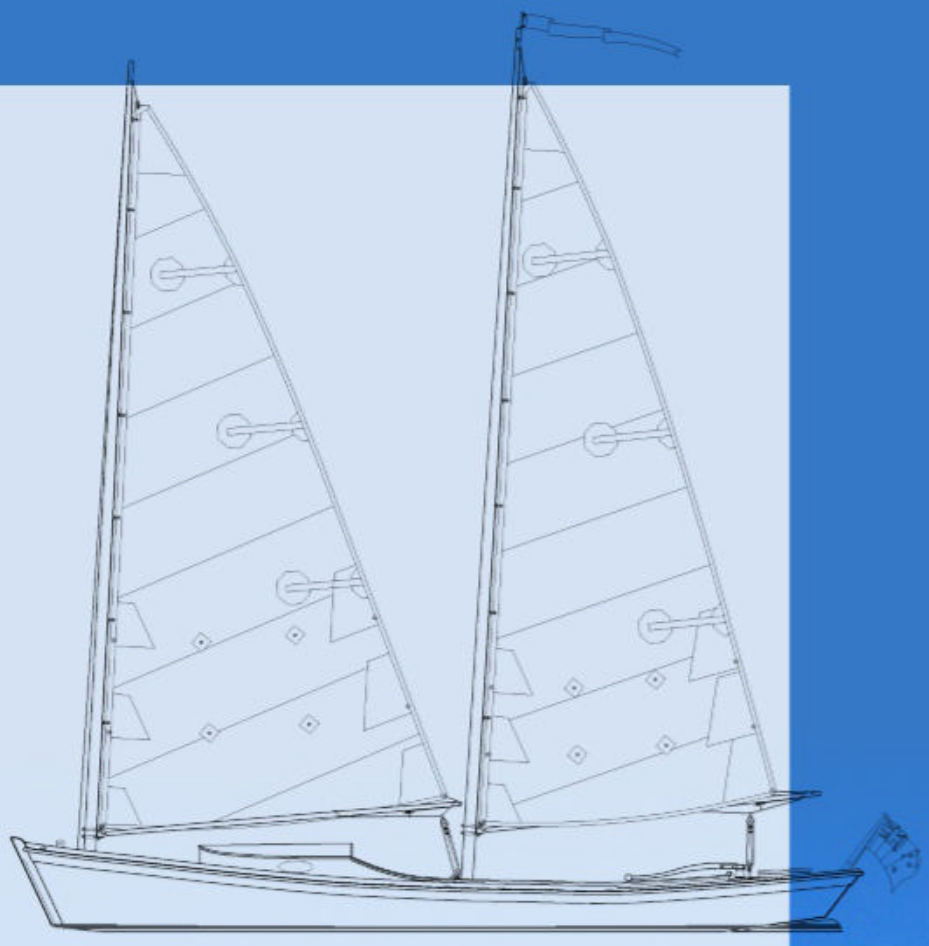
Schooner rig

A ‘schooner’ is a type of sailing craft; it usually has two or more masts and has fore and aft sails rather than square sails. The mast nearest the bow is called the ‘foremast’, while the one nearest the stern is called the ‘mainmast’.

A schooner’s mainmast is taller than its foremast. A ketch or yawl has a foremast that is taller than the other mast.

The advantages of the schooner rig is that the two sails are similar in size, so that, for a particular sail area, the size of the largest sail is as small as possible. This makes sail handling easier than in ketches and yawls, where there is a large sail and a smaller one — possibly much smaller.

For a trailerable daysailer, such as the *Milford 20*, the advantage of the schooner rig is that each of the two masts can be shorter than the foremast of a ketch or yawl and so can fit within the boat’s length — on a rack on top of the hull — while being stored or transported. The shorter masts are also much lighter, so can be more easily stepped into their housings in the hull.



Detailed building records

Neville kept detailed records of times and costs throughout the build process. Completing the hull cost, at the time, nearly $2K in materials and, very surprisingly, took only about one-eighth of the total build time.

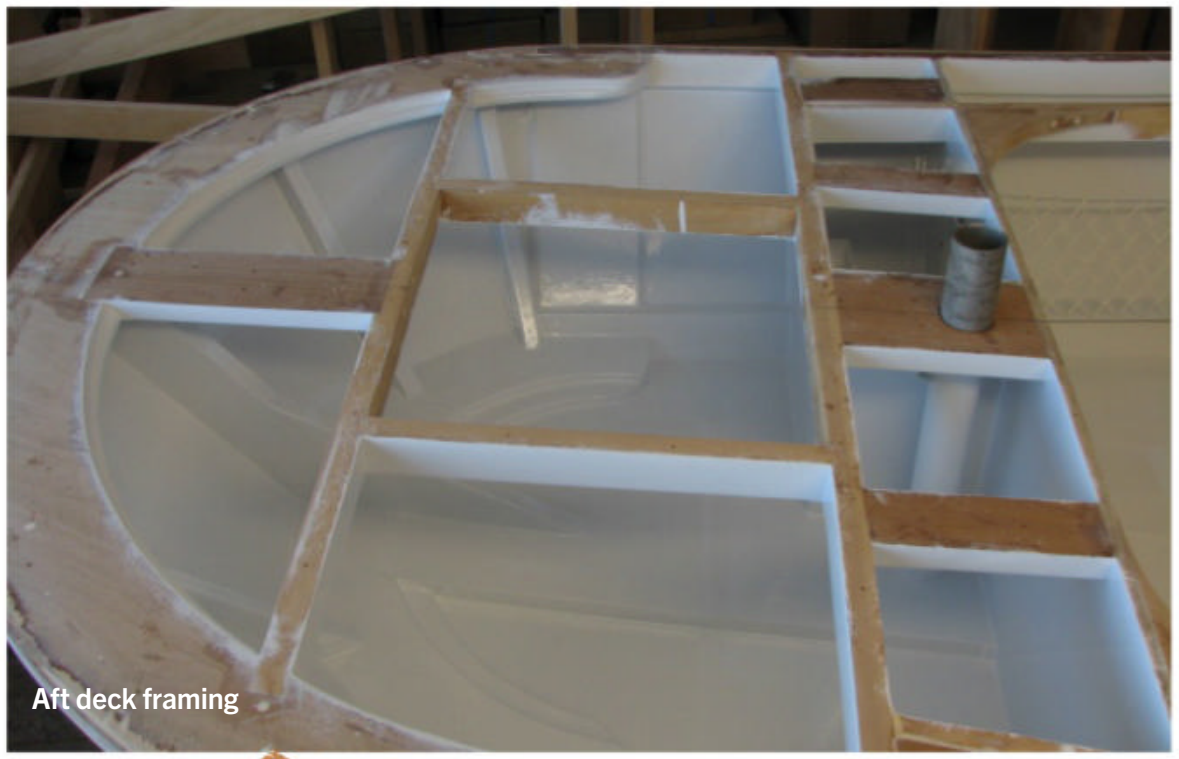
Sanding, varnishing, and painting the hull were overwhelmingly the most time-consuming and expensive part of the whole job. Engineering work, such as the rudder stem and the propeller drive, and sail-making — both of which were outsourced — were also relatively big-ticket items.

Neville used the machinery in the joinery workshop for many of the tasks. For instance, the business's spindle moulder was used to shape the components of the centreboard and rudder. The centreboard's cast-lead inclusions were cast professionally. Neville did have to buy a Canadian Veritas No. 4 smoothing plane to work on the wooden masts — the joinery workshop didn't have a single hand plane!

The two masts were fashioned from very close-grained American Oregon timber and are hollow to reduce weight. Neville wanted a boat that was quick to rig, so the masts are unstayed; they are held in position by the strong, snug housings that they are stepped into. The strength of the masts ensures that they don't bend too much in high winds.


Stern framing


Decking on bow


Aft deck framing

The two masts were fashioned from very close-grained American Oregon timber and are hollow to reduce weight


Rudder components

Completed rudder

Sharing the plans

Once the schooner was completed, Neville, who was delighted by its good manners and performance, had the idea that his plans could be sold to other amateur builders. Mark Fitzgerald was contacted and gave his approval, but to sell plans over the internet required that digital copies be made, so Neville had to learn to use the free and well-regarded French Draftsight drafting program. Sadly, Draftsight is now available only on subscription.

Over the past few years, Neville has had 200 applications for design packs at his website milfordboats.com and has sold complete sets of plans, with the associated construction manual, to 30 customers in different, often surprising, parts of the world.

Intermediate tech classes served him well

Neville largely gained his practical skills, he says, in the woodwork and metalwork classrooms of his local intermediate school. When he left school, he was a management cadet with New Zealand Industrial Gases (now BOC) and spent a short time in the engineering part of the business, where he was introduced to machine tools. He has owned various businesses, and that has made him very familiar with the digital world — his 'Milford Boats' website is all his own work, for instance, and he wrote and designed the boat's build manual.

While still in his teens, Neville was part of the pit crew of a local three-quarter midget speedway car powered by a 650cc Triumph Bonneville motorcycle engine, which drove the back wheels through a shaft that incorporated a dog clutch. Neville says that he learned a great deal during this time — for instance, he was responsible for the welding of the chassis of another race car. As a very welcome bonus, he meet socially several prominent American drivers, including four-time Indianapolis 500 winner AJ Foyt — who also won at Daytona and Le Mans.

As a young man, Neville owned dozens of motorcycles — often in partnership with a young neighbour — and sold all of them at a profit.

Neville and his brother, an experienced boatie, once built for a competition a well-performing example of the Elegant Punt, a design by celebrated US designer Philip Bolger, author of *Bolger's Boats* and many other books. The pair completed their task in two days, using construction ply, house-framing timber, and very few tools. ▶

Finishes used on the hull of the *Milford 20*

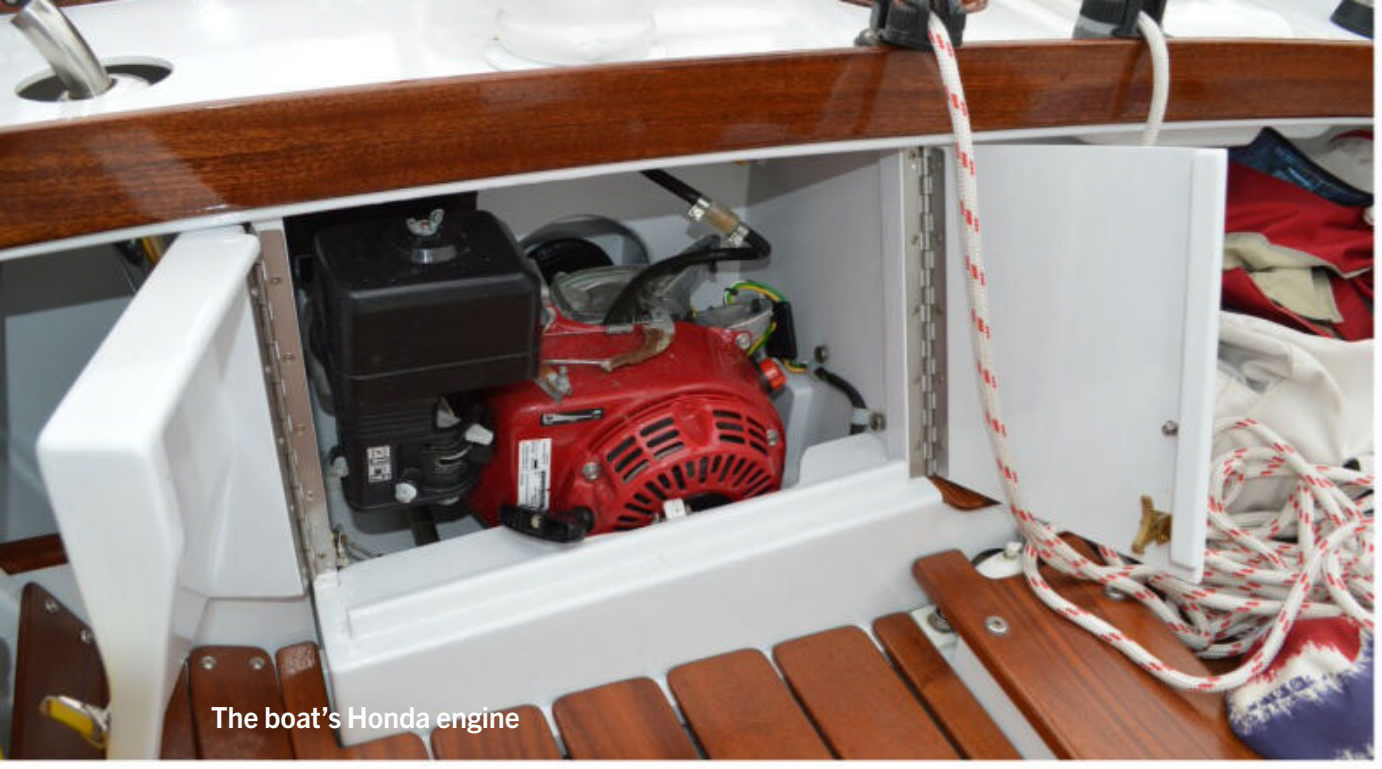
When I first met Neville Watkinson, he was planning to repaint the *Milford 20*, as it was nearly 10 years since it had been built. He used two-pack finishes for the whole boat with the exception of the hull's rubbing strip, which he envisioned would have to be regularly touched up, as the paint was worn away.

Two-pack finishes have unrivalled durability, but they are very costly and are much more difficult to use than ordinary finishes. Neville found it almost impossible to clean the brushes and rollers used to apply the finishes, and had to treat them as single-use items. He also found the tins containing the catalyst exceptionally difficult to open after the first couple of times. The lids of the containers would glue themselves very firmly in place after a few openings.

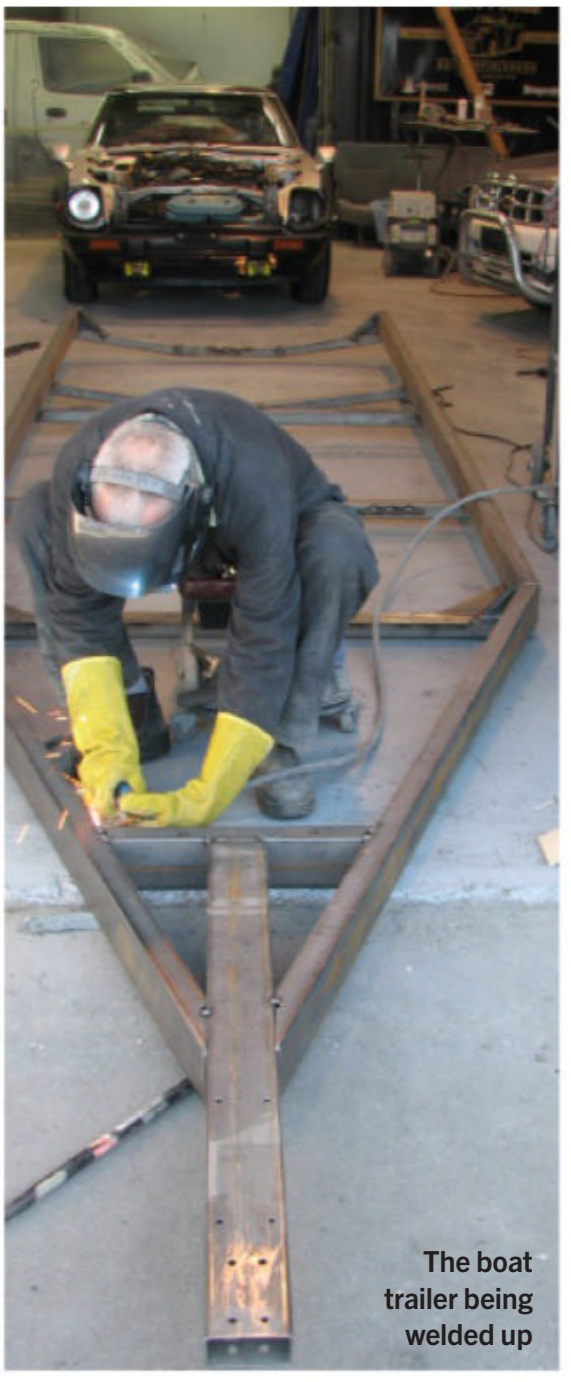
He discovered that the masking tape used to get a sharp junction where different finishes met had to be removed while the second coat was still wet or else it would be irreversibly clamped in position as the paint dried. He was surprised that the amount of catalyst was always exactly correct, but the volume of the resin was always more than that advertised. There was inevitably very expensive resin left over when all the catalyst had been used up. The deck's clear polyurethane finish was sprinkled with fine sand when wet to give a non-slip surface. A salt shaker gave a very even distribution of the sand.

Neville said he now has some sympathy for Philip Bolger's plan to paint the 14.6m *Resolution* — which he lived aboard in his later years, with his wife and books — with house paint, on an ongoing basis, as if it was a wooden commercial fishing boat.

Rubbing strip paint being inspected during repaint



The boat's Honda engine



The boat trailer being welded up

Future plans

Neville is currently developing other boat designs. His aim is to build and sell small plywood dinghies of his own design. The proposed size would allow the bottom and sides to be made from a single piece of plywood — normal-sized sheets — without the scarfing required to join two plywood pieces to make a section long enough to form the sides of the *Milford 20*. The advantage of serial builds of a single design is that the frames used in the construction process can be used again and again.

Model making

For years, Neville has been working on a model of HMS *Victory*, Lord Nelson's flagship, and this has given him an interest in cannons — the muzzle-loading, smooth-bore, large-calibre guns of 200 years ago; the sort of guns used by both attackers and defenders during attacks by British troops on Māori pā, such as Ruapekapeka, in 19th-century New Zealand. He owns a copy of a reprint of an 18th-century book on the technology of the time, which contains a large section on the design of cannons, including a formula for calculating

His aim is to build and sell small plywood dinghies of his own design

The sharpie schooner successfully lowered onto its trailer. The patterns for some of the products of Neville's business can be seen on the far wall

Neville Watkinson in his home workshop with one of his model cannons

the dimensions of various sized guns. These dimensions were arrived at after very extensive testing of a large number of prototypes.

Neville is of the opinion that the cannons often seen on model ships are very inaccurate. He has nearly finished a short monograph on cannons for ship modellers, with many drawings, which he hopes will improve the accuracy of the ordinance on model warships. Cannons were named after the mass of the projectiles they fired, mainly 32 pounders and 24 pounders on HMS *Victory*. He was surprised that many of the cannons on the actual *Victory*, which is preserved at Portsmouth in Britain, are fibreglass reproductions and that the ship's gun carriages are of comparatively recent manufacture.

Replica cannons

Neville is in the process of making two one-fifth-scale reproductions of Nelson's 24-pound cannons, drawn up using Draftsight. Faithful in every detail, on period-correct carriages, they will stand protectively on each side of his drinks cabinet. The barrels were formed out of European beech on the very large copy lathe that Neville used in his business. Using a hydraulic linkage, this Spanish machine reproduces the shape of a sample very accurately. The barrels were painted with black lacquer.

The cannons' carriages were made using American white oak and are a faithful scale model of the original, complete with the metal dowels that locate the wooden pieces. Bolts hold the structures together; 200 years ago wrought-iron rivets would have been used. Neville says that gun carriages were subjected to extreme stresses when the guns were fired and often needed repair after seeing action. ▶

Neville is in the process of making two one-fifth-scale reproductions of Nelson's 24-pound cannons

Cannons in the Musket Wars and New Zealand Wars

Three or four centuries before Europeans arrived in New Zealand, competition for resources caused conflict between iwi, leading to the building of thousands of fortified pā around the country and the very labour-intensive production of weapons, such as mere, from various materials, notably pounamu (New Zealand greenstone) using sandstone grinding stones (hōanga).

With the Europeans came guns, and these had a profound effect on Māori. Just one musket could dramatically intensify long-standing inter-tribal disputes, leading to devastating loss of life. In combination with introduced diseases, the inter-tribal Musket Wars (1807–1838) were responsible for a significant decrease in the Māori population, with some iwi being completely wiped out.

A small number of larger bore weapons — cannons — were also involved in this warfare and in the disparate Māori–settler Government conflicts, known as the 'New Zealand Wars', after the signing of the Treaty of Waitangi in 1840. Some of the cannons belonging to Māori are still in existence and can be visited.

Sailing the *Milford 20*

Neville Watkinson very generously took me out sailing in the *Milford 20* sharpie schooner twice; once to Quail Island in Lyttelton Harbour and, on another, brighter day, on the estuary of the Avon and Heathcote rivers. Both were exhilarating experiences.

Neville has a Holden ute especially for towing the schooner on the trailer, which he designed and made. We travelled to Lyttleton through the road tunnel and rigged the boat at the Naval Point Club's slipway. This process required the two masts to be stepped, the tiller attached, and the sails prepared for hoisting. Neville is used to sailing with inexperienced crew and had a well-practised scheme for the tasks, which we carried out successfully.

This was the first time I had realised that an elegant sailing craft will collect a small crowd of onlookers, even on a mid-week morning at a nearly deserted launching ramp. It's hard to come up with a close comparison — stopping at a busy gas station in the centre of town in an open classic sports car such as a D-Type Jaguar, perhaps. We were the centre of attention. I left it to Neville, of course, to answer all the questions.

Once we were on the water, the centreboard was lowered, the sails were raised, Neville pushed away from the jetty, instructed me to steer for the opposite side of the harbour, pulled in the sheets (ropes) that controlled the sails, and we were off. The wind was fairly light and there was a moderate chop of small waves on the water's surface, but we whizzed along.

The hull's 6m length and shallow draught (240mm) result in the *Milford 20* having an easily driven hull; not much propulsive force is needed to get it moving at close to its theoretical maximum speed. The weight of the deep, heavy centreboard means that its hull is quite stiff; a large force sideways was needed to get it to 'heel' — meaning to be leant sideways by the wind. It was a comfortable and dry sail, and my initial fears that I was going to do something stupid and cause catastrophe, based on a memorable experience, began to fade.

The *Milford 20* pulled up on Quail Island's beach

The shallow draught is a bonus

The idea of a daysailer like the *Milford 20* is that it gets you to rather inaccessible, little-visited beaches without a lot of fuss. We tacked around the eastern end of Quail Island and steered towards our destination. Neville raised the centreboard, released the sheets, and our momentum carried us onto the deserted beach, near the Victorian quarantine barracks and to the foundations of the kennels where Captain Scott's huskies were kept in 1901 and 1910. I was able to jump onto the sand without getting my feet wet. We sat on the beach's sea wall and ate our lunch. Neville also has a routine for producing hot coffee — it involves a high-tech stove — and had made an impressive stack of excellent sandwiches.

When we took to the estuary some days later, we again collected onlookers, who asked questions as we rigged the boat. This time we picnicked at a city council reserve on the estuary side of the New Brighton spit, which had a long jetty suitable for mooring the *Milford 20*. Here a new friend, Gary, helped us to eat another stack of sandwiches.


Neville (left) and Gary. The high-tech stove's top is just visible at the bottom of the picture

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ALIBRE 101

PART 4

In part four, we learn to take advantage of the clever features of the Alibre Atom 3D software to create a vee pulley

By Bob Hulme
Photographs: Bob Hulme

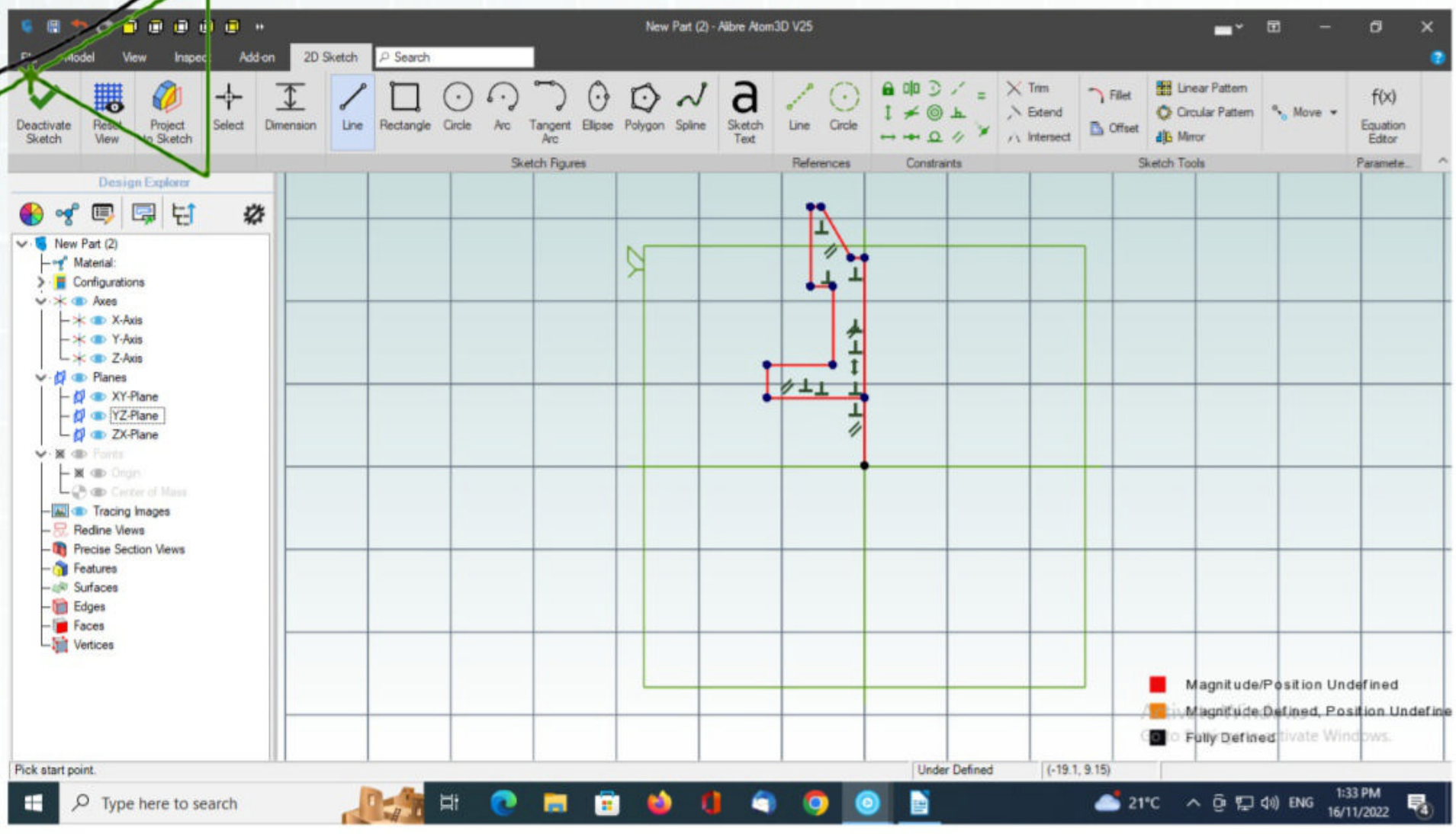
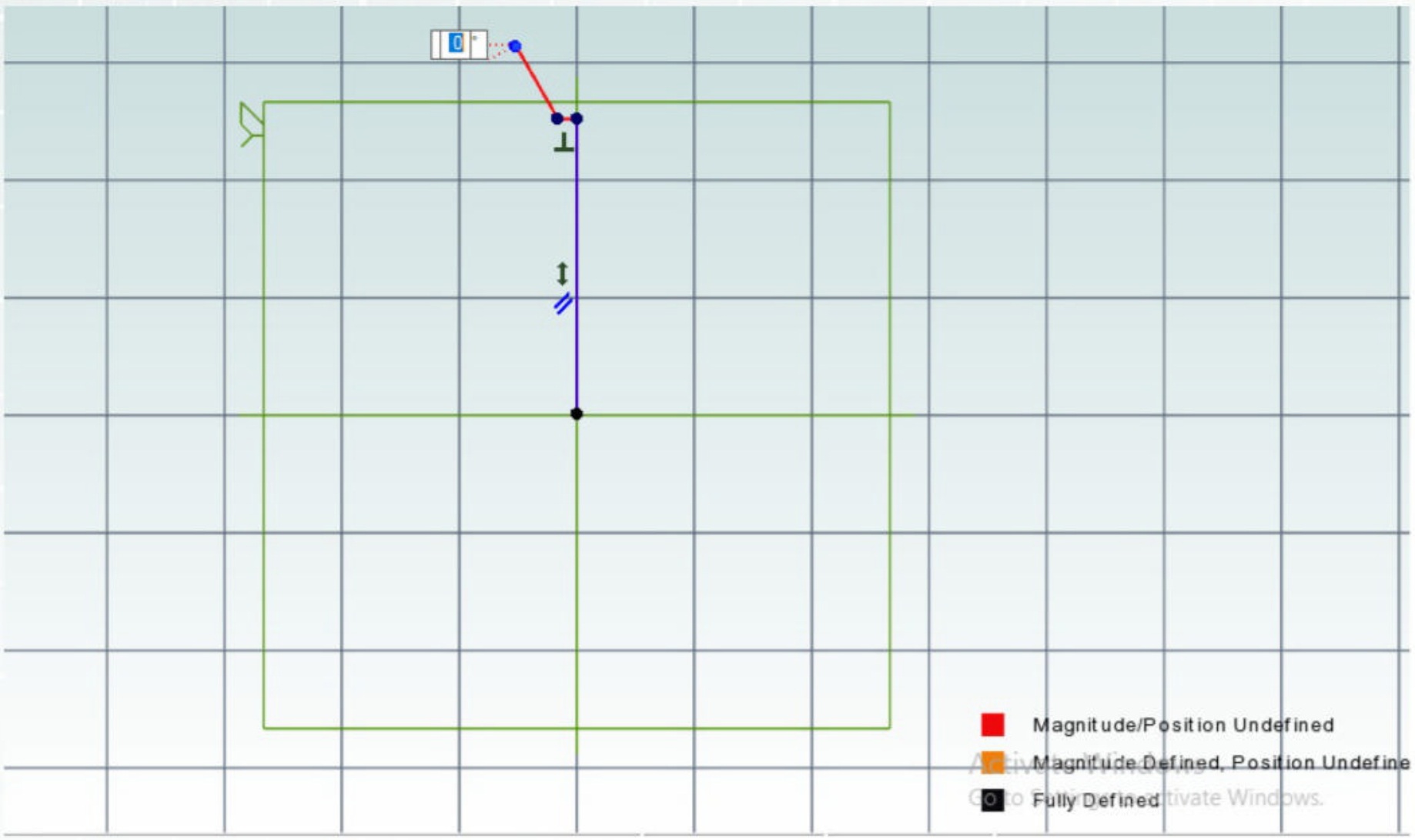


Fig. 1: The first sketch

Fig. 2: Starting from the origin point



In this, part four of the series, we will be creating a vee pulley using mirroring and patterning tools. Fig. 15 shows the completed pulley.

This takes your skills another step forward as we learn how to use more of the handy tools available in the Alibre Atom 3D program. In part three, we learnt how to produce a 2D drawing from the 3D model that we had created of the 17mm deep socket, so, after completing this vee-pulley design, you might like to produce a drawing of it too.

The process begins

Start by opening the Alibre Atom program and looking at the home page. Click on the New Part icon. You can determine what each icon represents by moving the cursor over it; some text will appear stating what that particular icon does.

The workspace will open up with a ribbon toolbar across the top of the page and the Design Explorer table down the left side. In the working area of the page, there should be some grid lines representing the XY, YZ, and ZX planes. Select the YZ plane either by highlighting and clicking the lines of that plane in the workspace or by clicking YZ Plane in the Design Explorer. (When I say to click on something, I am meaning one click on the left mouse button.) Then click on the Activate Sketch button at the left end of the toolbar ribbon running across the top of the page.

What we are going to sketch first can be seen in Fig. 1.

The game plan

It is good to see where we are headed with this and to understand the approach. By looking at Fig. 1, you will see that the sketch appears to be floating above the horizontal grid line that passes through the origin point. This is because the pulley has a bore through the centre so that it can fit onto a shaft. The sketch we want to make only outlines the solid material of the pulley.

The reason only half of the pulley is shown is that I'm a bit lazy and know of a way to save work. What is about to happen is that the sketched patch will be extruded. However, it will not be in a straight line but in a circular direction. (You may remember that in part one we extruded a sketch of a circle to make a solid cylinder.) This will give us a solid half-pulley. Then we will use the Mirroring tool to make the other half of the pulley appear.

Saving time and effort is not the only advantage. If we want to alter some aspect of the pulley design or dimensions, for example, all we have to do is edit the sketch where the details to be changed were created and the mirrored side is automatically changed as well. This could be important on parts that are expected to be symmetrical. ▶

It is good to see where we are headed with this and to understand the approach

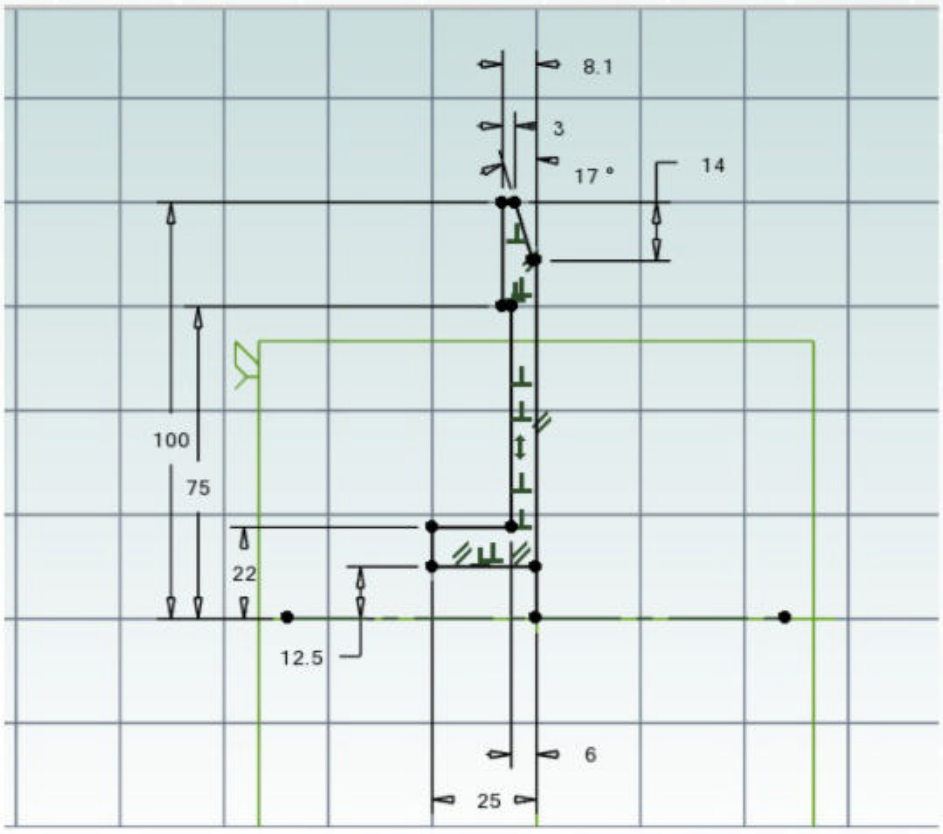


Fig. 3: The dimensions to use

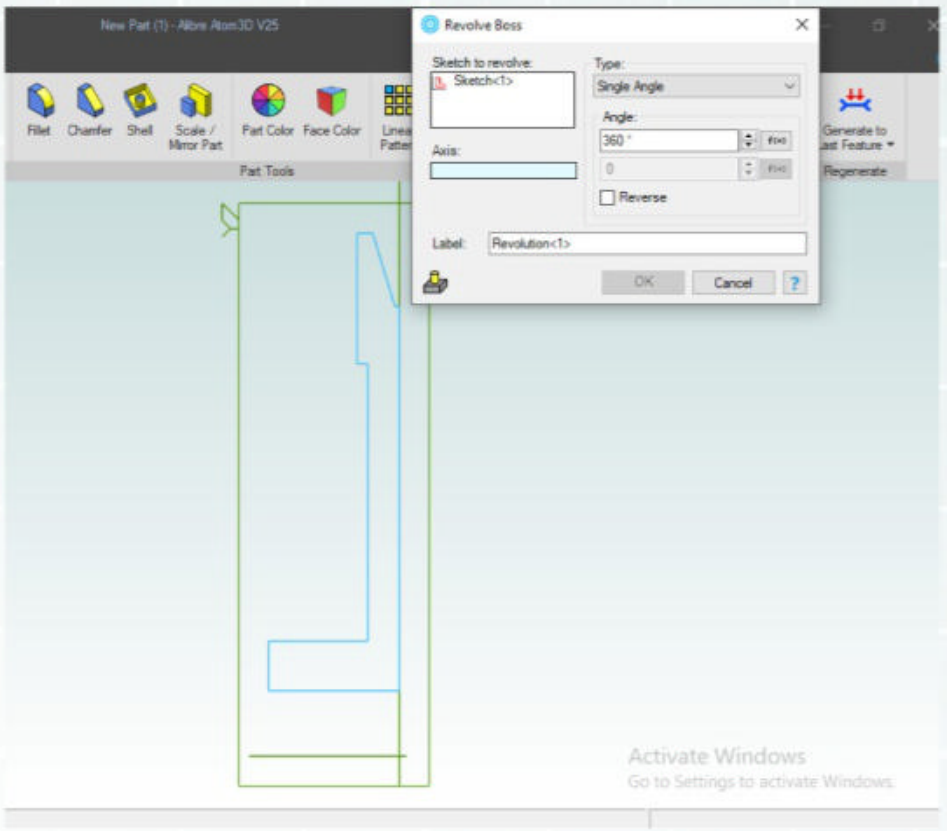


Fig. 4: The Revolve tool dialogue box

It is beneficial to start the first vertical line at the origin point so that we are certain that it lies in line with the vertical line passing through the origin point

Step by step

So, we have our sketch ready to be started. Pick the Line tool from the sketching tools section in the toolbar ribbon. While we are not going to sketch right on the horizontal line through the origin, it is beneficial to start the first vertical line at the origin point so that we are certain that it lies in line with the vertical line passing through the origin point. This is because that vertical line will be the axis for our mirroring.

You will remember from part one that, to make a sketch line using the Line tool, you simply click on the starting point — in this case, the origin point, which will turn blue when the cursor is directly on it — move the cursor to where you want the end of the line to be, and click again. The next line will start from the end of the line just drawn, and you only need to click an end point for it, which, of course, can be the start point for the line after that (Fig. 2).

If you are not sketching lines running on from one another like that, you will need to exit the Line tool and reselect it to draw a separate line elsewhere. Selecting a different tool, such as the one for drawing an arc, will automatically switch off the Line tool. Another way of switching off whichever tool you are using is to press the Esc button on your keyboard.

For the angled side of the vee groove, just draw a line, guessing what the angle looks like. When we add dimensions, we will specify the angle and the line will move to the exact inclination. Be careful to make a small horizontal line at the bottom of the vee groove so that it can have a flat bottom. Just guess where the lines need to be, making sure they look roughly in the right proportions and positions.

Next, start putting the dimensions on the sketch. Select the Dimension tool from the toolbar ribbon and away you go. I like to have some sort of order in which I do the dimensions; in this case, I did all the vertical distances first. Having a method rather than randomly adding dimensions helps to make sure none is missed. When all those are in place, dimension the angle of the vee groove side. The groove dimensions are to suit a B-section vee belt. All the dimensions are shown in Fig. 3.

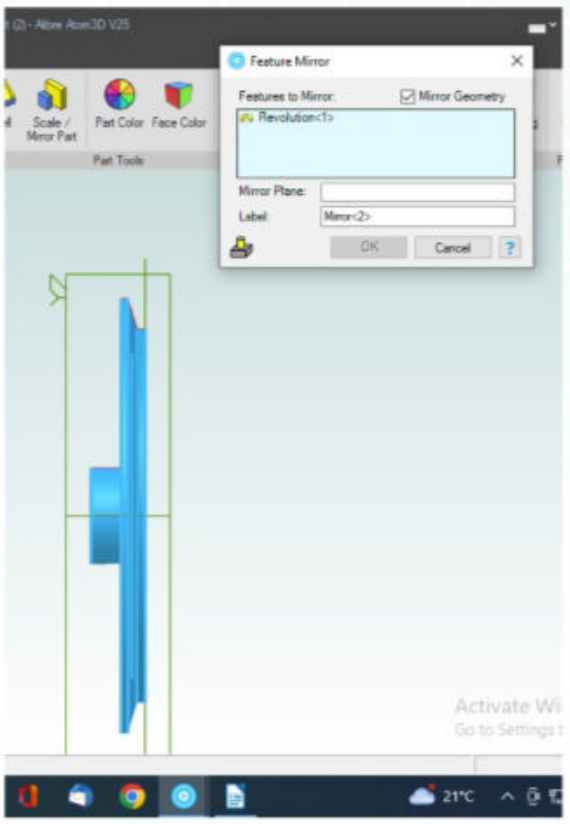


Fig. 5: The Mirror tool dialogue box

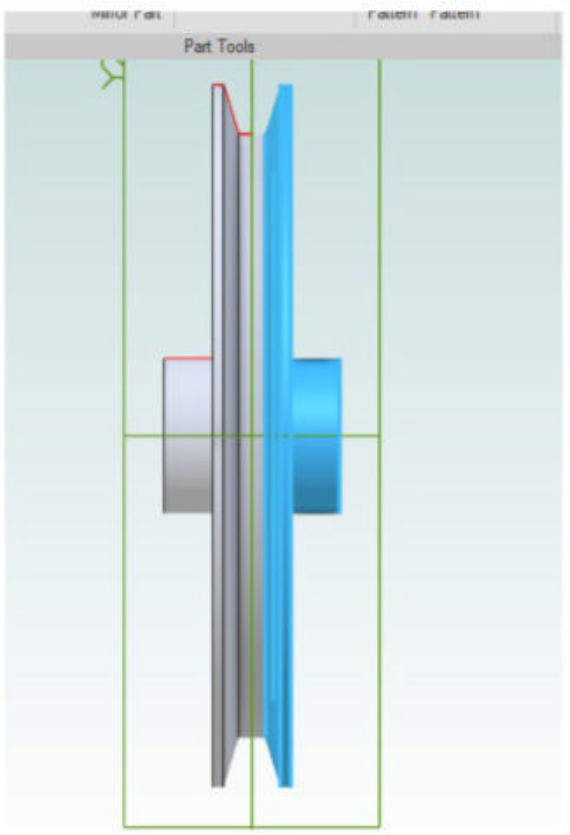


Fig. 6: Mirroring done

Rounding off

Before closing the sketch, we can add fillet radii to knock off those sharp corners and make it into a classy job. You may have to enlarge the image to make it easier to see where your radii are. Do this by rotating the mouse wheel one way or the other.

Click on the Fillet tool in the Sketch tools section of the toolbar ribbon. A box will appear asking for details of what size the fillet radii are to be and where they are to be applied. Most people refer to this as a 'dialogue' box because the program is effectively chatting with you to find out what size of fillet you want and where you want it.

Set the radius to 0.5mm and click on the side and the bottom lines of the vee groove. Click Apply in the box that came up when you clicked the Fillet tool. Use the same process to make a radius of 0.5mm on the top edge of the vee groove. You can change to a larger radius on other corners if you would like to. Go around all the other corners in the sketch, except those that are on the vertical line through the origin point. Select two adjacent lines, then click Apply before going on to the next corner and repeating.

To finish tidying up the sketch, click on the Trim tool in the Sketch tools section of the toolbar ribbon and trim off the lower part of the vertical line that connects down to the origin point that we drew at the beginning. When the cursor is over it, it will change colour. Simply click it and it will be trimmed off. At this stage, all the lines defining the sketch will change to a black colour and the sketch will be complete.

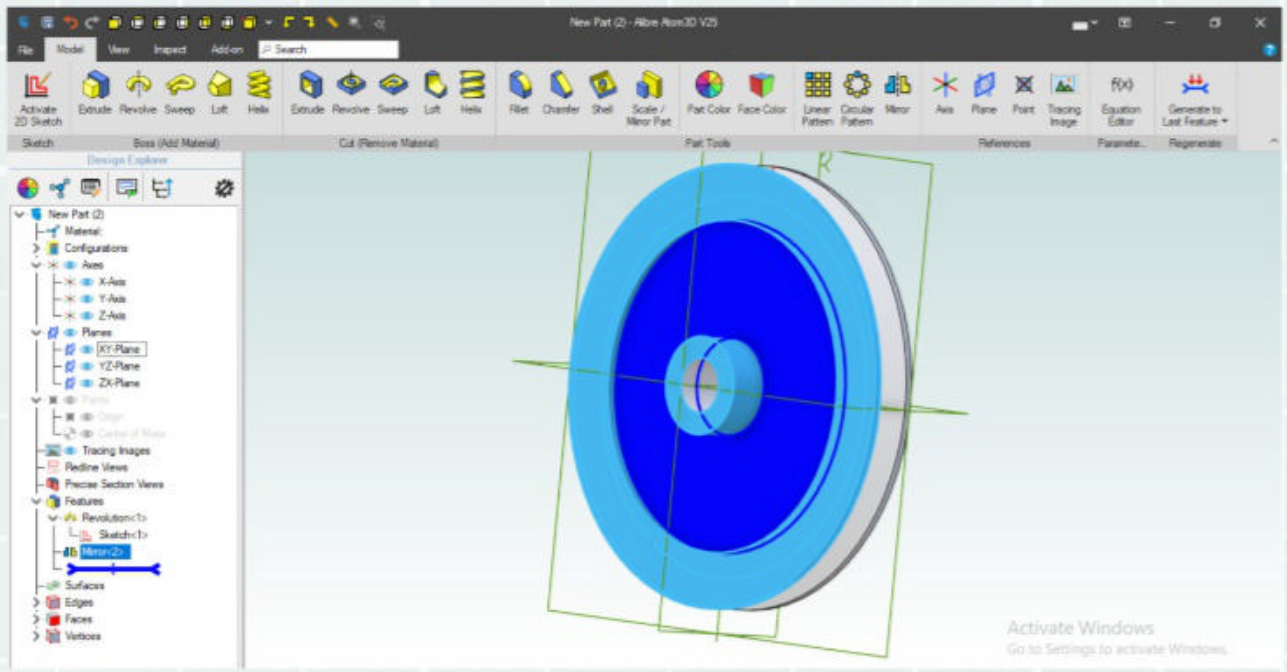


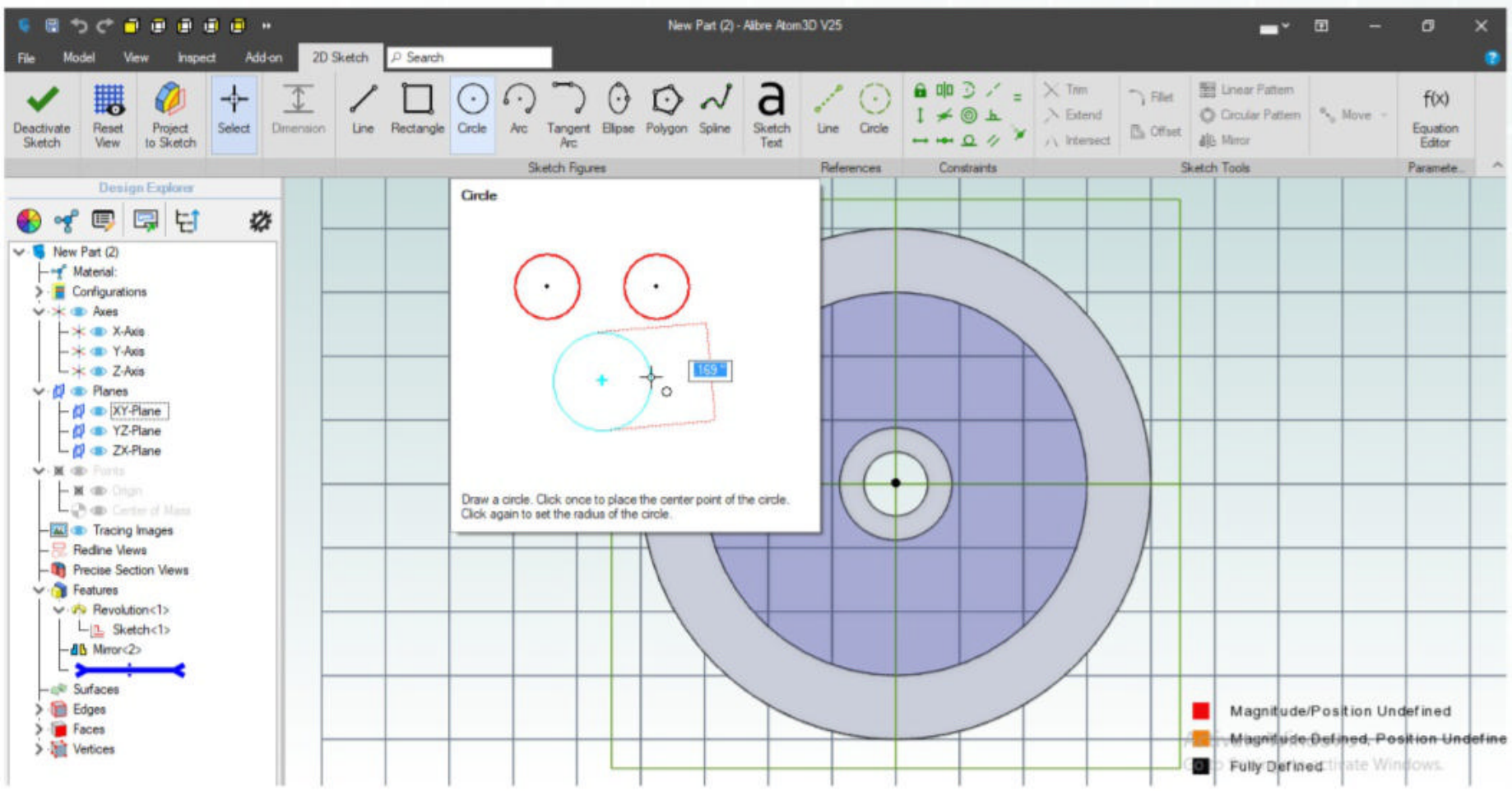
Fig. 7: Selecting the web to sketch on

Oops, hang on. As soon as we clipped that excess line off, the sketch went from 'Defined' to 'Undefined'

Oops, hang on. As soon as we clipped that excess line off, the sketch went from 'Defined' to 'Undefined'. What's going on? It would appear that the end of that line was anchored to the origin point to locate the vertical line. However, when we snipped the end off, it no longer fixed where the line remaining was positioned. To fix this, go to the Constraints section of the toolbar ribbon and select the Collinear tool. Next, select the vertical line of our sketch, which needs to be directly over the origin point and the axis line over which we first drew it. Click OK, and the sketch becomes fully defined again. Whew, crisis averted.

Click Deactivate Sketch. ▶

Fig. 8: The Circle tool for sketching



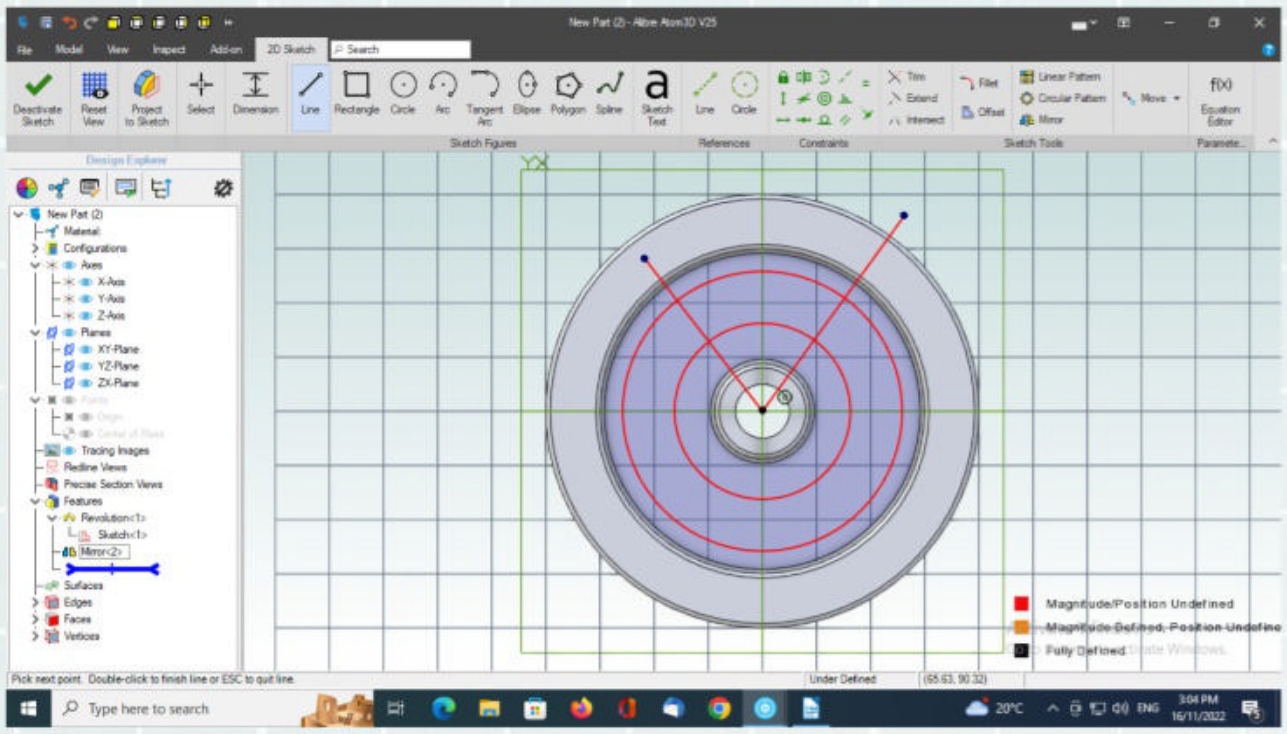


Fig. 9: Circles sketched, as well as unequal lines

Just when you thought we were finished, there's more to do

Going full circle

Now it gets to be more fun. Click on the Revolve tool in the Boss (Add Material) section of the toolbar ribbon. A box will appear in the workspace wanting to know what axis you want to revolve around (Fig. 4). That is one of those dialogue boxes again. Click on the horizontal line that goes through the origin point and, bingo, a preview of the revolve extrude will be shown. If it looks like half of a vee pulley, then click on OK.

Double vision

Now, select the Mirror tool in the Part Tools section of the toolbar ribbon. It will ask what plane to mirror. Use the listing of planes in the Design Explorer table at the left side of the screen. The XY plane is the one to select. A preview will appear; if the image is now of a full vee pulley, click on OK (Fig. 5). Bingo, we have a solid vee pulley (Fig. 6)! At this stage, you can see the solid perspectives of the pulley by moving your mouse around while holding both buttons down at once.

But wait, there's more

Just when you thought we were finished, there's more to do. Either the weight is an issue or we need holes in the pulley to access some bolts behind it when it is on its shaft (or both). So we will make a new sketch on the face of what is best described as the web of the pulley — that is, the thin bit of material that joins the boss to the outer rim.

In a 3D view, select the face shown in Fig. 7. It turns blue when the cursor is over it so you know that is what you are selecting. Click on Activate Sketch in the toolbar ribbon. The image will turn so that the face to be sketched on is facing directly towards you. Select the Circle tool (Fig. 8) and sketch two circles with their centre on the origin point (Fig. 9).

Now, select the Line tool and draw two lines from the origin point outwards at angles roughly as shown. Be careful to avoid making them the same length — or close to the same — as the auto constraints would then be invoked, as indicated by the equals sign being shown by both lines (Fig. 10).

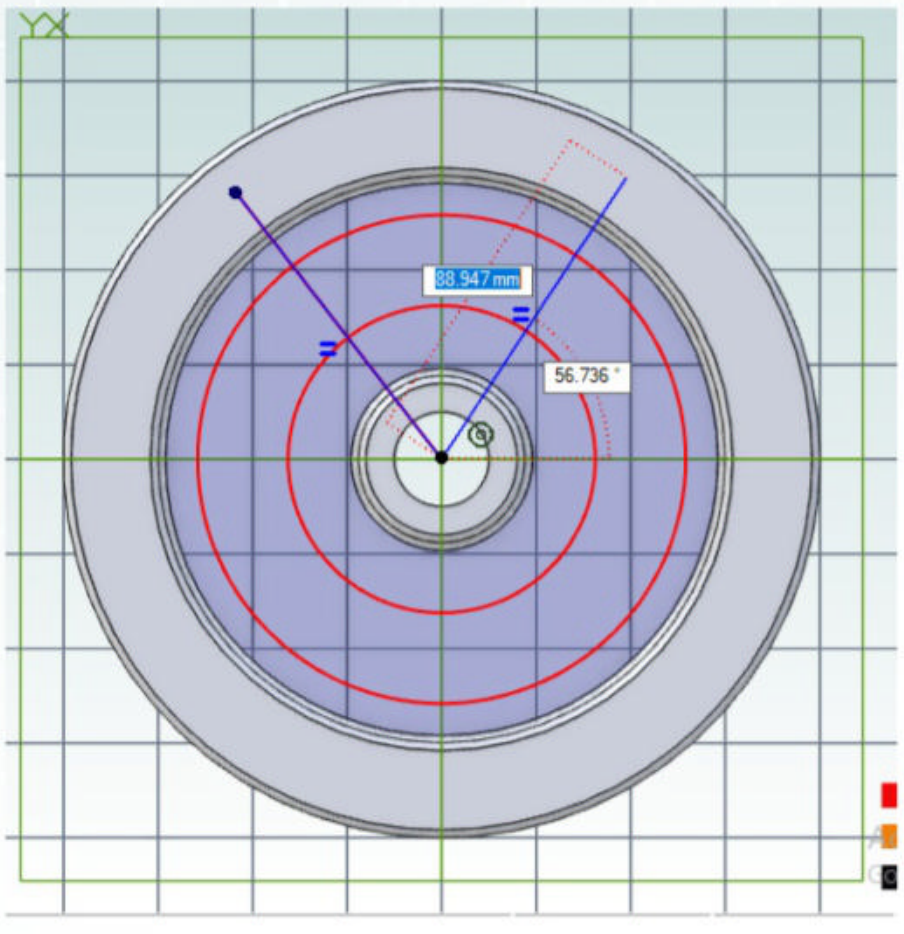


Fig. 10: A problem if the lines are constrained as equal

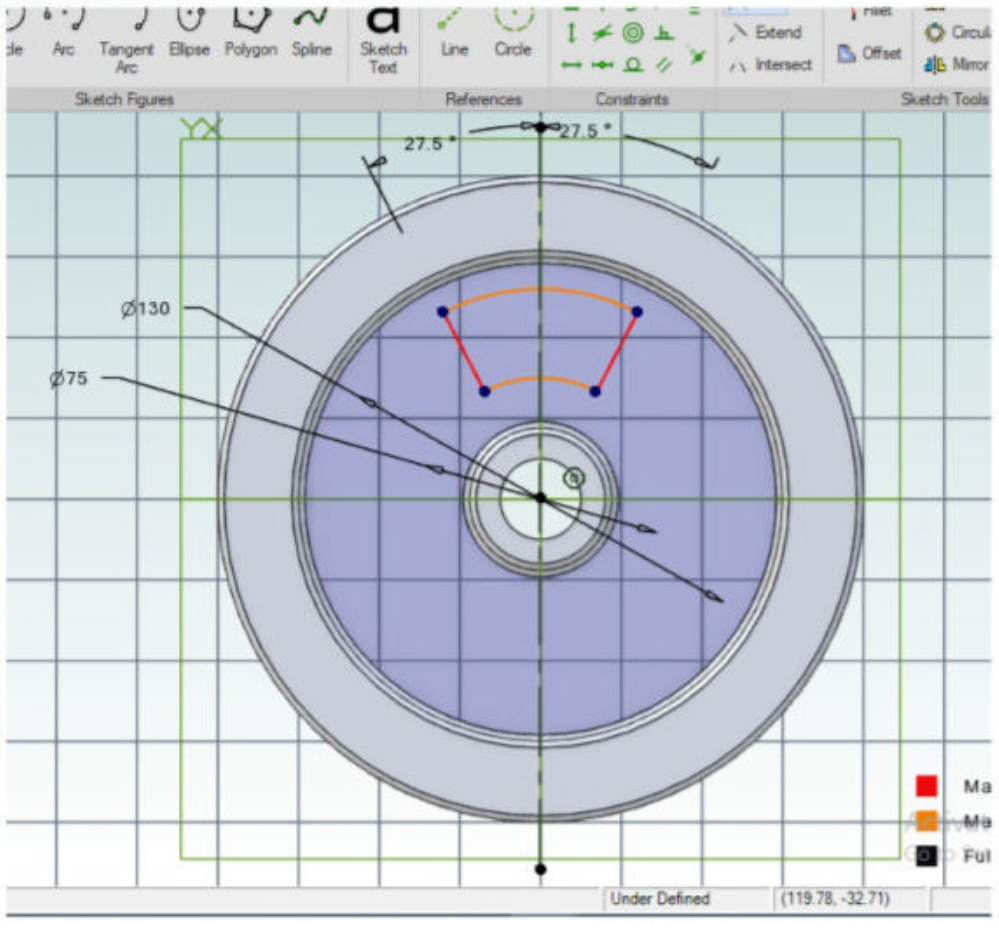


Fig. 11: The circles and lines after trimming

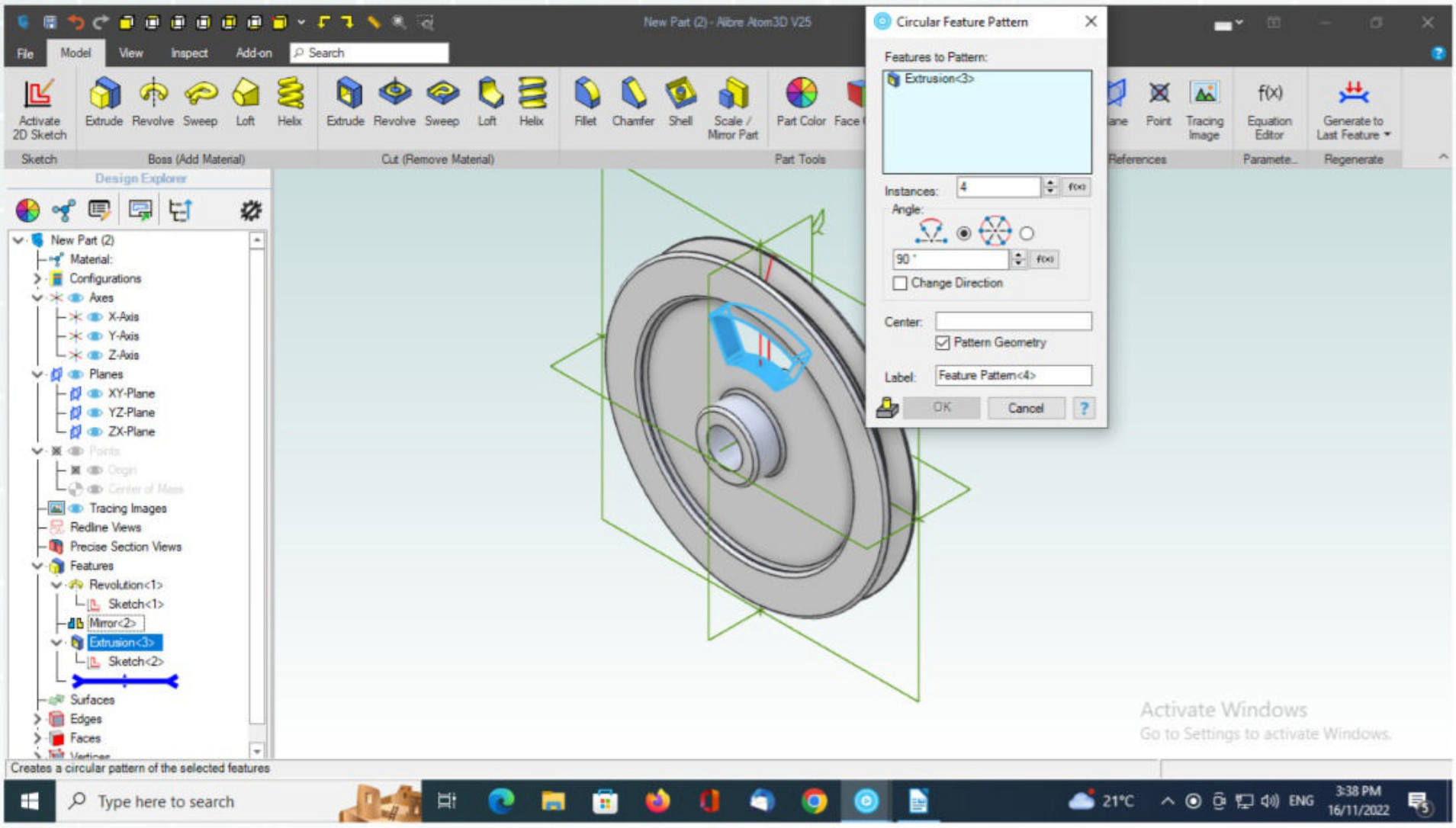


Fig. 12: The Circular Pattern tool dialogue box

Avoid constraint

We don't particularly want this to constrain us at the moment. It is better to extend the second line far enough for it not to be considered a candidate for constraint to an equal length to the first line. If they are constrained in this way, it could be difficult for us to trim the lines later.

Select the Dimension tool, and set each of the angled lines to be 27.5 degrees to the vertical line through the origin point. Next, dimension the two circles — the larger one to 130mm diameter and the smaller one to 75mm diameter. Now we can use the Trim tool to trim away the bits of the circles and the lines that we don't want, until we have the profile shown in Fig. 11.

Again, we don't want sharp corners, so we will use the Fillet tool to fix that. A radius of 2mm will be fine. When all four corners are done, click Deactivate Sketch. The toolbar ribbon changes to show the tools that we can choose from now. We want to cut this shape through the web of the pulley, so select Extrude from the Cut (Remove Material) section. A box appears in the workspace. Select Through All from the options under Type. Click OK, and the shape will be cut out of the web. ▶

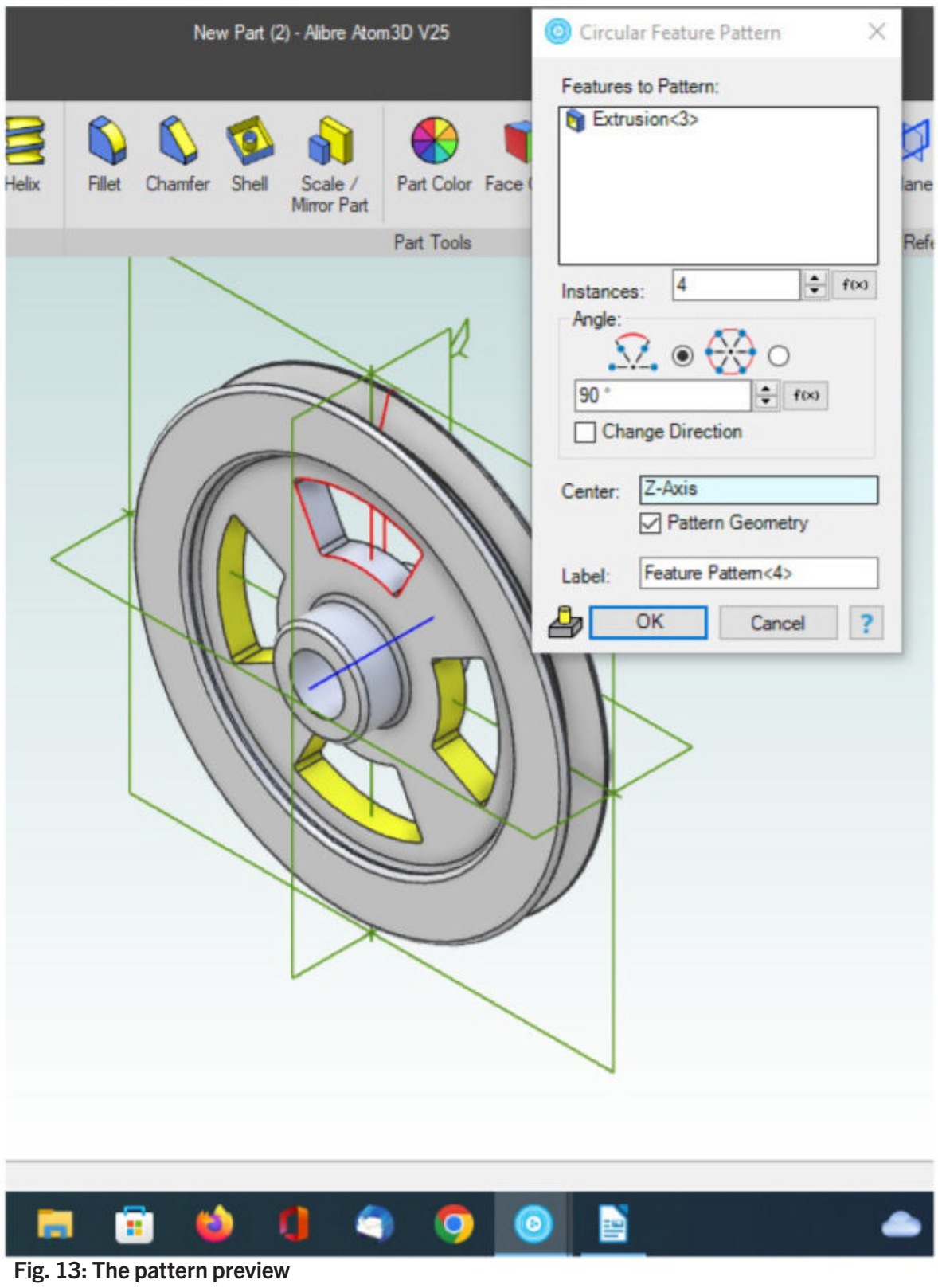


Fig. 13: The pattern preview

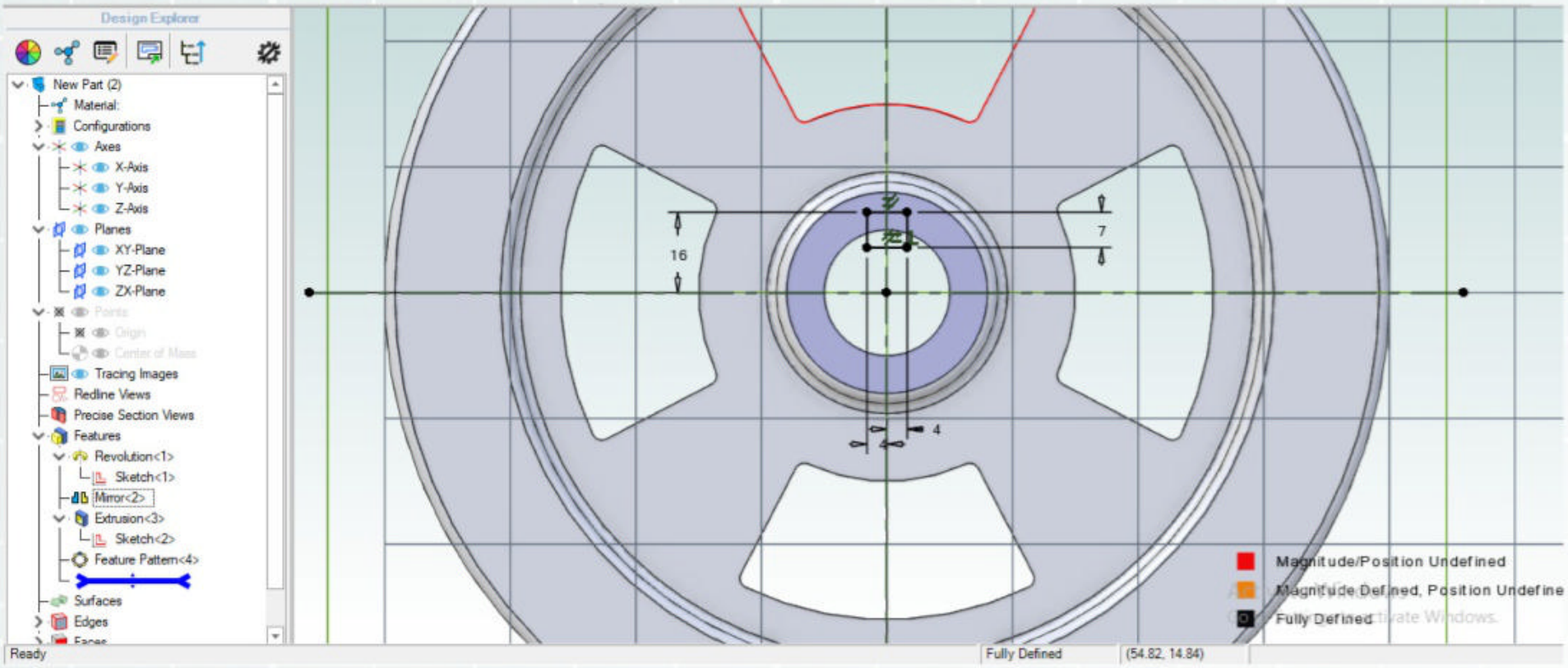


Fig. 14: The keyway sketch

Nice patterns

Rather than repeating the process of making a sketch and cutting out each of four shapes the same in the web, we can use the Pattern tool to do all the work for us. There's my lazy streak showing itself again. The first shape we sketched and cut through is known as the 'Seed'. Any changes made to that at a later date will automatically be replicated in all the other instances patterned around the pulley.

Click on the Circular Pattern tool in the Part Tools section of the toolbar ribbon. A box will appear and ask some very pertinent questions (Fig. 12).

These questions relate to important information, such as how many instances you want of the feature, where the centre of the circle is, and whether you want them spread around the whole 360 degrees. That's because it is clever enough to pattern cutouts, or whatever, around only half a circle or a particular number of degrees that you select.

Select four as the number of instances and 90 degrees for the spacing. Then select the axis through the centre of the pulley as the rotation axis. A preview will appear (Fig. 13); if it is what you were expecting, click OK.

The key

Finally, we could add the keyway in the bore of the pulley just to show off how well we are doing with these new-found skills. We will make a sketch on the end of the boss, then extrude it right through. The standard key for a 50mm diameter shaft is 8mm wide by 7mm high. You can use the Line tool again, but there is a Rectangle tool that will make it easier. Simply click roughly where you want any two diagonal corners and the Rectangle tool does the rest. Add dimensions to put it in the right place with the right sizes (Fig. 14). Then close the sketch and do an extrude cut right through it all.

If at any stage of using Alibre you get into difficulties, there is a handy feature in many of the boxes that pop into view when you select a tool. Look for the question mark in the lower right corner. Click on it, and you will have direct access to helpful information related to that tool. No need to search through a whole pile of help files; the specific one is right there.

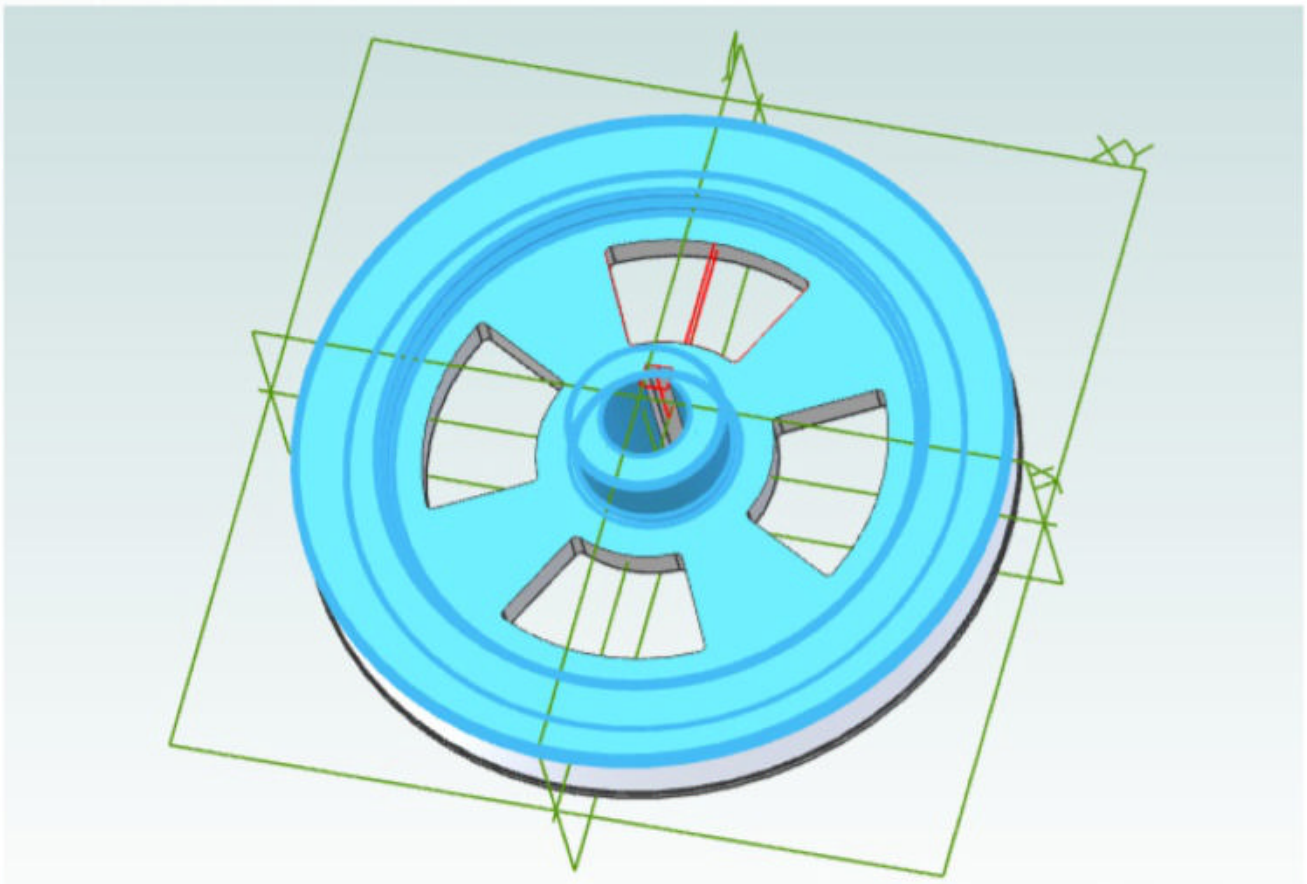


Fig. 15: The finished vee pulley

What have we learnt from part four?

We have learnt that it's OK to be lazy and let Alibre Atom do a lot of the work for you. This program is like a pet puppy: it knows lots of clever tricks and is eager to show them off, just to please you. It is good at figuring out patterns and using a mirror. However, this program is smarter than a puppy because it can have a conversation with you using dialogue boxes.

Coming up in part five

We take our skills to lofty heights when we find out about — yes, you guessed it — 'lofting': how to create smooth, flowing shapes.

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Folded hoist being moved on pallet jack

USING BRAIN WHEN BRAWN ISN'T AVAILABLE

Some of the unavoidable problems that come with ageing can be circumvented by smart thinking and innovation

By Des Bromilow
Photographs: Des Bromilow

The problem that I am trying to solve: getting older and weaker. Since I don't have a solution for the problem, I figure I can try to work smarter by designing and building something to reduce the impacts of the problem.

One impact is the challenge of lifting heavy things, such as chucks onto the spindle of the lathe or a vice or universal dividing head onto the table of a milling machine.

The tasks I've mentioned would require a crane with very fine levels of adjustment on the crane hook, especially when handling a chuck onto the threaded spindle of my big lathe. I already have an engine crane, and it is quite capable of lifting weights exceeding two tonnes. However, it has limited mobility when something is on the hook, due to the large footprint of its fold-out legs, and the small-diameter steel castor wheels do not lend themselves to fine movement when under load. An example of the engine crane is shown in Photo 1.

I already have a pallet jack, and a number of my benches, my big lathe, and my big milling machine are able to be moved with a standard 2.5-tonne pallet jack. One thing that pallet jacks are designed for is their manoeuvrability even when fully loaded. ▶

Since I don't have a solution for the problem, I figure I can try to work smarter by designing and building something to reduce the impacts of the problem

Photo 1: Example engine crane as sold by a number of mechanical/ industrial suppliers

Improving on what I have seen

Some years ago I saw a web page article about someone grafting the mast and jib of an engine crane to the shortened base of a pallet jack to create a manoeuvrable crane. It looked like a good marriage of the benefits of both machines, but it had some limitations. One of the biggest limitations was that the modification was a permanent modification that prevented the pallet jack from being fully utilised for its original purpose.

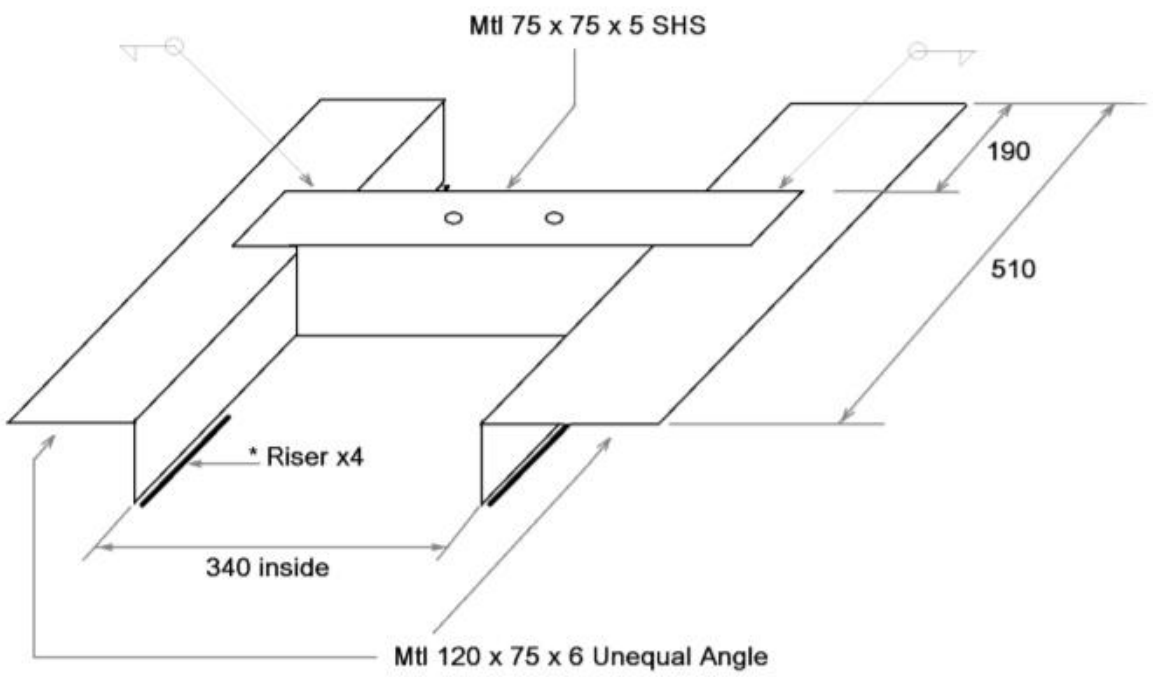
My design makes the incorporation of the crane to the pallet jack a temporary attachment, that can be added or removed with minimal effort, with no modifications that affect the original purpose of the pallet jack. This design not only retains the functionality of the pallet jack but also allows the crane to be stored with a minimum footprint on valuable shed floor space (Photo 2).

My design also includes a small winch as an auxiliary lifting point. This is useful for items lighter than 500kg, and at maximum jib extension. You could consider the addition of the winch as optional, but I include it in the description so you know how to add it if you wish.

Photo 2: The pallet jack becomes the base and wheels of the hoist

My design makes the incorporation of the crane to the pallet jack a temporary attachment that can be added or removed with minimal effort

Sketch 1: Crane base



Step one: Obtain a pallet jack and an engine crane

My engine crane was a damaged one bought at a garage sale for a very modest sum, and as mentioned I already have a pallet jack around which several shed items were designed. I repaired the damage to the engine crane, and obtained a 500kg winch to be incorporated into the design. I salvaged a few pulley sheaves from wrecked exercise machines and purchased a clevis hook to suit the winch cable.

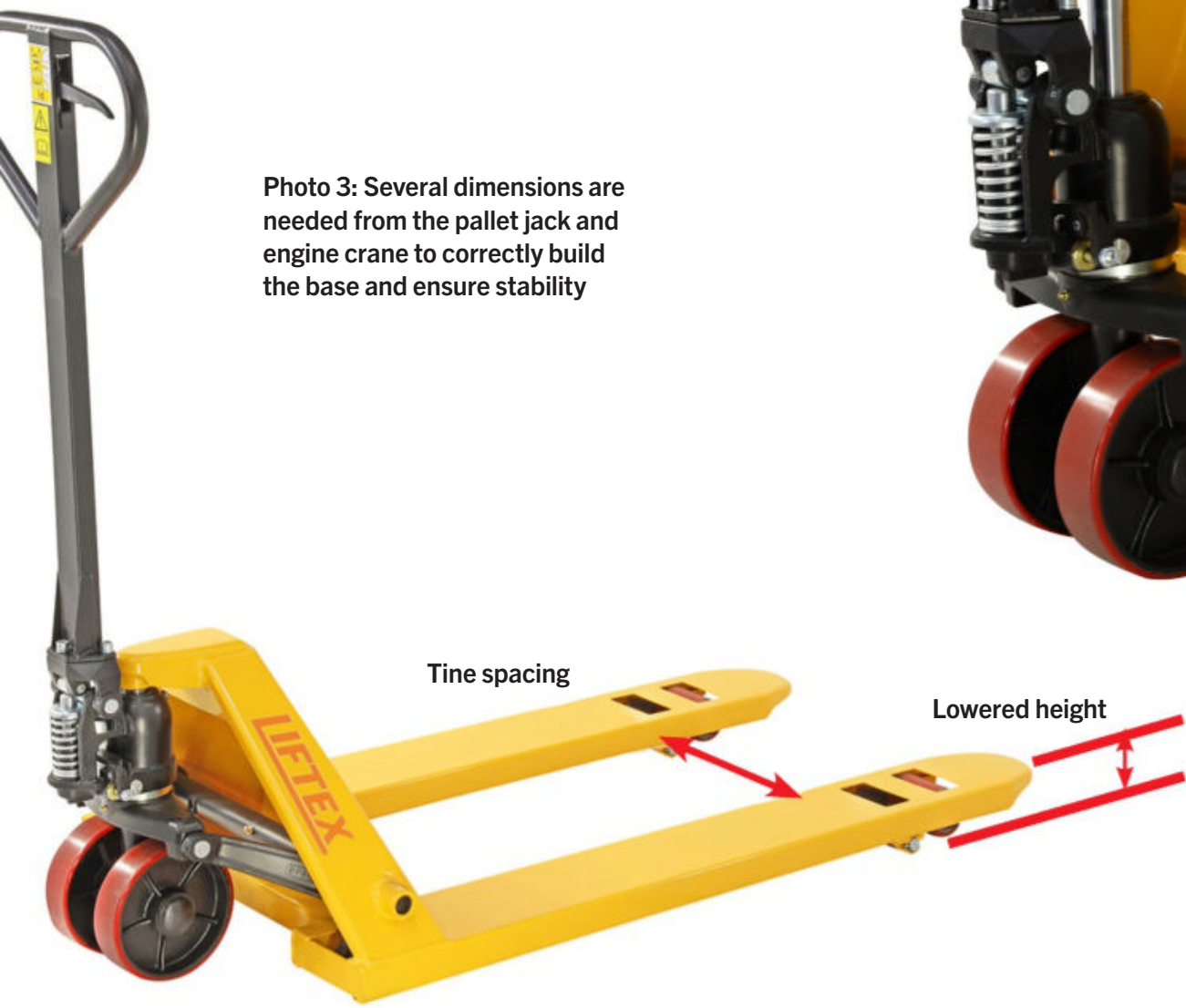
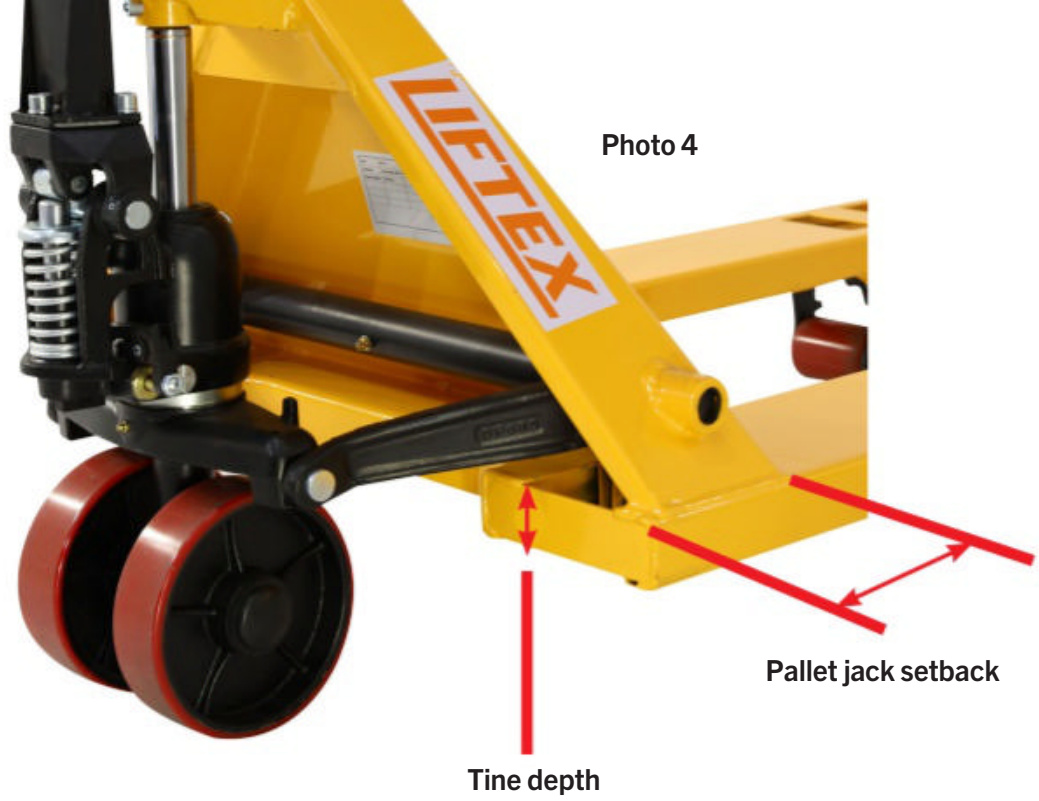


Photo 3: Several dimensions are needed from the pallet jack and engine crane to correctly build the base and ensure stability



Step two: Measure some critical dimensions

While both pallet jacks and engine cranes are fairly standard, there are often subtle differences in design and materials. All of the dimensions given in this article are based on the equipment that I have, and I will explain where those critical dimensions are used so you can determine what the equivalent adjustments would be on yours (Photos 3–5).

Some critical dimensions are needed to ensure that pieces will fit together. These include:

- the dimensions of the end of the jib — material size and size/location of the hole that secures the short hook chain often fitted
- the mount for the mast to the base — hole size and centre-to-centre distance
- the dimensions of the top strap on the jib sleeve
- the hole size of the crane straps at the base connection
- the distance between the pallet jack tines
- the height of the tines when in the lowest positions — top of tine to ground
- the details of the winch mount — bolt sizes and centres
- the dimensions of the pulley sheave — axle bolt size, hub width, and overall diameter.

Other dimensions are needed for stability. These include:

- the dimensions of the rear of the pallet jack
- the distance of the setback on the crane straps compared with the mast base. ▶

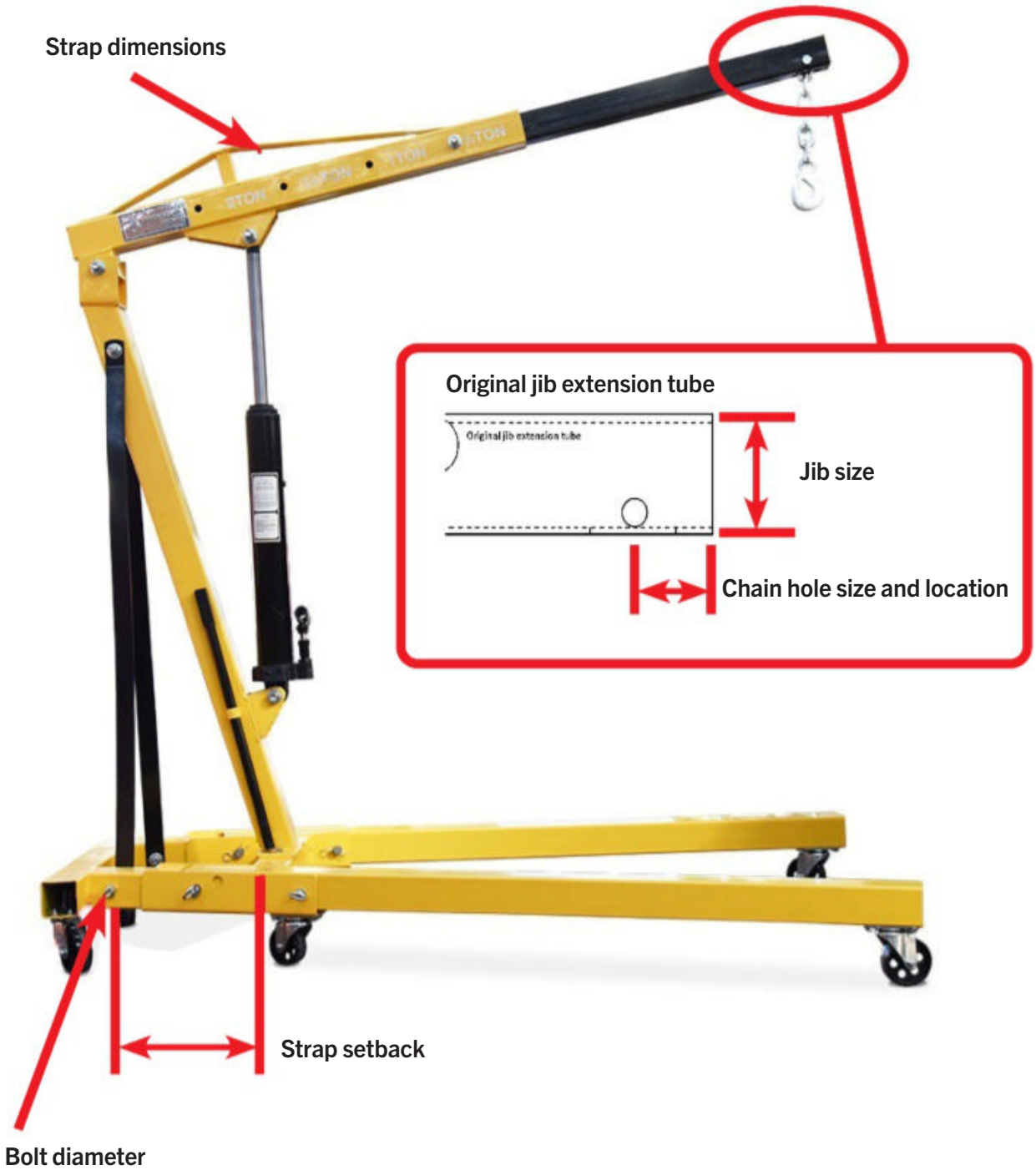


Photo 5

Photo 6: The base has a working clearance between the tines of the pallet jack so it can be picked up easily

Step three: Make the base

The base of the device is an H-shaped piece that sits on the shed floor while in storage. The tines of the pallet jack can fit around/under it to move it in and out of storage, and support the crane during operation.

The distance between the tines of the pallet jack will dictate the length of the cross-piece — minus allowances for material thickness and operating clearances. A suitable piece of square hollow section (SHS) tubing was marked out to suit. The original crane base was made of 70x70x3mm SHS, and I had some 75x75x5mm SHS offcuts of a suitable length to make the cross-piece. I marked and drilled the holes for the mast attachment bolts and cut out the steel in preparation for welding. See Sketches 1 and 2 for details.

The original mast base had 14mm bolts, which passed through the SHS with exposed thread and a hex nut on the bottom surface. In my application, the thread and nut would cause issues with ground clearance, so I made up two 'sleeve nuts' so that the thread was contained within the SHS tube. Sketch 2 has details on these sleeve nuts, which were made using some common black steel bar and some short lengths of round tubing — electrical conduit or water pipe will suffice. I drilled, bored, and tapped the 9/16-inch UNC thread in the 20mm bar on the lathe and faced the short lengths of pipe so I had good surfaces for welding them together. I then turned the welds down to nominal size to keep the sleeve uniform diameter. I could have used 14mm bolts but did not have the appropriate tap in my set.

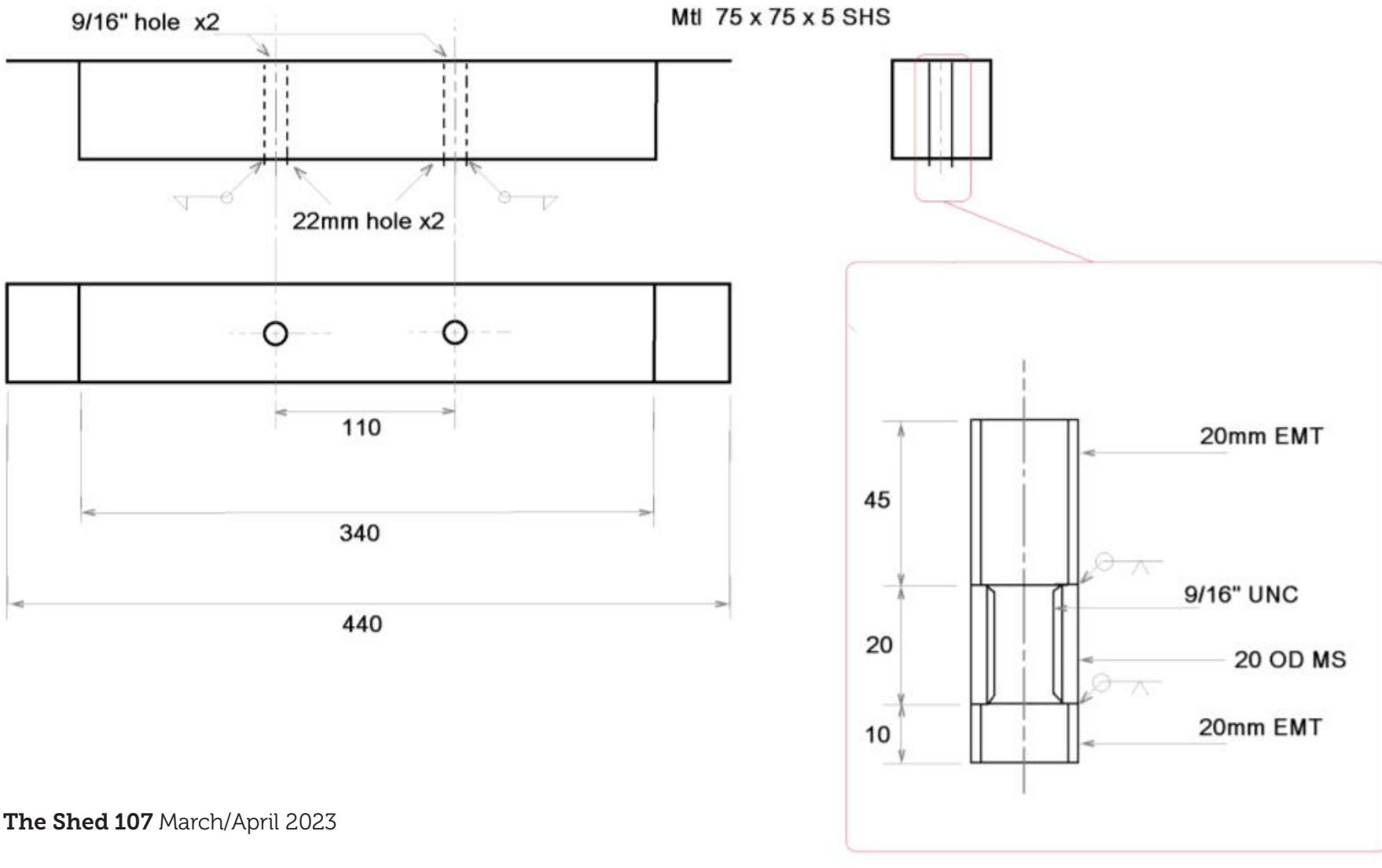
Sleeves

The holes drilled in the SHS were 9/16-inch clearance on the top wall of the SHS and loose clearance holes for the finished sleeve nut diameter in the bottom wall. I bolted the mast base to the SHS using vice grips to hold the sleeve nuts while the bolts were spun tight and then fillet welded them in place on the bottom wall of the SHS.

After disassembly, I ground the protruding sleeve down so it protruded by only ~4mm. The bolts used to secure the mast to the base were three inches long (75mm), so no thread from the bolt protrudes below the SHS bottom wall regardless of the mast baseplate thickness.

The cross-piece is positioned between two angle-iron pieces such that the vertical legs of the angle have a clearance fit between the tines of the pallet jack, and the horizontal legs rest on the top surface of the tines. I used a clearance of 5mm on the tines. I tacked the cross-piece in place and checked that it was square before completely welding in the piece.

Sketch 2: Crane base



The angle-iron section

The dimensions of the angle-iron section used need to be determined. This is the process I used.

The overall length of the angle sections was to be the same as or longer than the wheelbase of the original crane base. That would provide similar stability while in the folded (storage) configuration.

“The overall length of the angle sections was to be the same as or longer than the wheelbase of the original crane base. That would provide similar stability while in the folded (storage) configuration”

The width of the vertical leg was to be within 10 per cent of the width of the walls in the original SHS, since the resistance to bending in a beam is mostly influenced by the depth of the beam. The tines of the pallet jack contribute to that, but rather than calculate something that complex, I chose to remain close in size. The thickness of material in the angle section was to be close to twice the wall thickness of the original SHS base, since the new base had two fewer ‘walls’ in the beam structure to reduce deflection. Luckily, I had some offcuts of 120x75x6mm unequal angle that met all of my criteria, but I could have used 75x75x6mm equal angle and still been comfortable with my material choice.

The offset from the rear of the pieces to the cross-piece was to ensure that the back straps made contact with the back of the pallet jack with an angle that prevented ‘peeling forces’ on the mast base. The distance between the original crane mast and straps was used as a guide, and increased marginally to allow for some ease in fitting. To achieve this, the straps have to be vertical, or angled so the top of the strap is towards the front of the pallet jack. Essentially, if you copy the angle of the original straps, the forces on the mast base should be manageable by the mounting bolts.

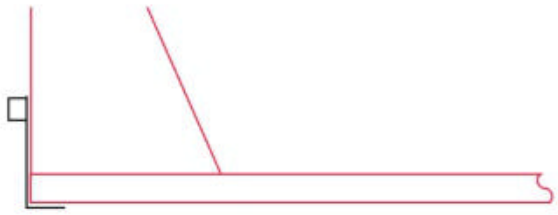
Photo 7: The unit is on the pallet jack with the stabilising straps connected to the brackets fitted to the jack

Fitting some feet

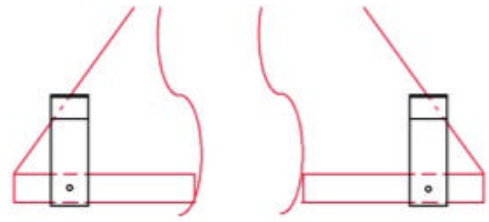
Once the base was welded, I added some small feet on the lowest edges of the angle to ensure that the tines of the pallet jack — when in the lowered position — could slide underneath the base with a clearance of approximately 5mm (Photo 6). This clearance allowed for any deviations in the floor of the shed or debris adhered to a wheel of the jack. This clearance, plus the inherent stability of the base when folded, means that I can use the tips of the tines to pick up the finished unit from its storage location in the shed, move it out into the centre of the shed floor, put it on the ground or floor, and then slide the entire length of tines in to position it on the jack properly before attempting to use the machine (Photo 7).

Note: the feet were 100mm lengths of 10x10mm square bar, but they could have easily been adjustable screw feet or offcuts of some other steel section. Looking back, if I were to make another version of this machine, I would use short lengths of angle section with the feet on the inside. That would allow the machine base to be easily positioned with a standard moving trolley, as well as the pallet jack tines. ▶

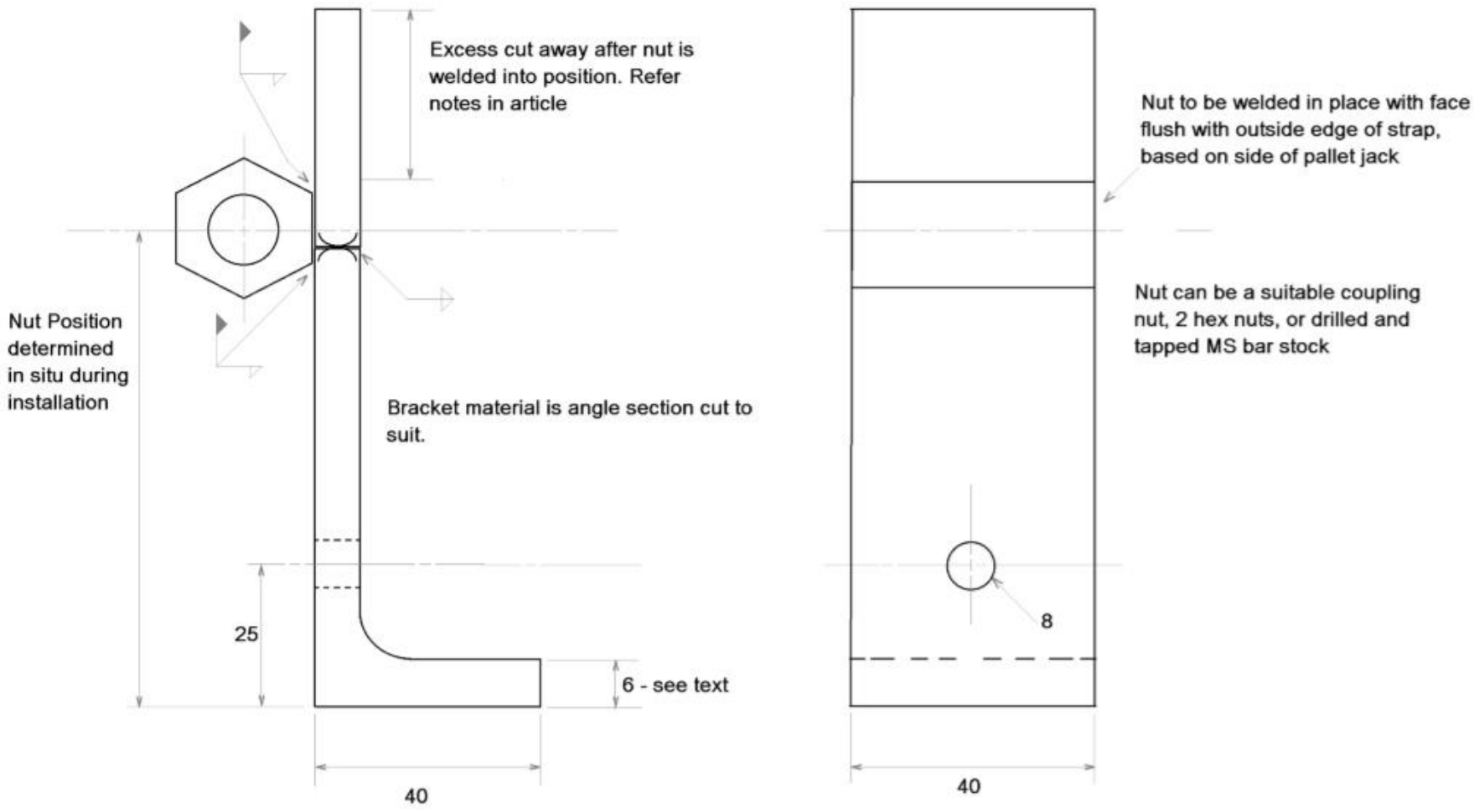
Sketch 3: Strap attachment bracket — two required with mirrored nut placement



Side View of pallet jack showing mounting configuration



Partial rear view of pallet jack showing mounting configuration



Step four: The strap connectors

At the conclusion of step three, the base has been fabricated, and with the crane mast — including jib and boom — bolted in place, the unit is quite stable in the folded storage configuration. Testing showed that my unit was stable with the jib extended to horizontal, with the boom fully extended. However, it took only a heavy touch — say, 2kg of downforce — on the boom tip for the machine to attempt to topple off the pallet jack.

The original crane design has two 40x4mm straps, which are bolted high on the mast and connect to the base some distance behind the mast baseplate. These straps prevent the forces on the mast from peeling the baseplate bolts, and add incredible stability to the mast when it is loaded.

The straps from the original crane are retained at the mast connection by a single bolt at the top, which connects

Photo 8: Two of these strap connectors are the only modification to the pallet jack and can be left in place for normal operations

a strap on each side of the mast, and one bolt per strap at the bottom. The bottom of the straps is splayed out to add rigidity against sideways movement. To retain that effect, the bottom of the straps is brought to the rear of the pallet jack, one on each side.

Note: if you are planning to reuse the straps from an original crane, take note of the bolt-hole size at the bottom connection — my crane had 16mm bolts, with clearance holes to suit.

Brackets

Two L-shaped brackets are made up with a short (40mm) leg designed to sit underneath the rear of the pallet jack — the back of the welded tines — flush with the rear surface of the jack. I made my brackets from 40mm wide cuts of the angle section used to make the base, making one leg 40mm long. I then welded the cut of pieces to the other leg to make it longer for the fitting stage. I marked and drilled an 8mm hole in the upright of the L-bracket such that a washer and nut would not clash with the upper or lower walls of the hollow tine. In my case, the tine was approximately 25mm deep, so I simply positioned the hole 12mm above the inner corner of the L-bracket so that the bolt-hole was centred in the depth of the tine. See Sketch 3 for an overview of these brackets.

> **"If you are planning to reuse the straps from an original crane, take note of the bolt-hole size at the bottom connection"**

A pair of 'bracket nuts' needs to be sourced or made. These are to receive the bolts that retain the strap. In my case, it should be M16. Since I did not have any long (coupling) nuts in M16, and no tap in M16, I chose to use a pair of standard M16 hex nuts to make up each bracket nut. It is better to use a coupling nut or a fabricated deep nut — drilled and tapped bar stock — since two hex nuts welded together are prone to binding due to welding distortion that can only be eased by passing a tap through the finished nut.

Positioning the straps

With the crane mast bolted to the baseplate and the pallet jack lifted high, a pair of clamps can be used to stop the crane toppling as you position one strap to the back of the pallet jack and mark an approximate intersection with the angled rear of the jack. I used a strip of masking tape on the side to mark the hole position. ▶

Photo 9: The crane is very stable under load once the straps are connected to the pallet jack

Position the bracket (L-piece) so that it intersects the mark so that a nut flush on the bracket would be completely proud of the rear of the jack when viewed parallel with the tines. Drill the mating hole through the rear of the jack tine, or use a clamp to secure the bracket in place.

Place a bolt through the bottom hole of the strap, and affix the nut so it is tight. Position the nut against the back of the bracket — ensuring that the face of the nut is flush with the bracket and the strap is not binding against the sloped side of the jack. Tack weld the nut into place on the bracket. Repeat for the other side strap — the alignment of the nut to the outside edge of the bracket will make each bracket a mirror image of the other.

Photo 10: Test load of 120kg taken at full jib extension for testing stability and manoeuvrability

Minor mods to pallet jack

Remove the bolts and remove the brackets from the pallet jack. The nuts can now be fully welded to the brackets, and any excess metal removed from above the nuts.

The two holes (M8 in my case) drilled into the back of the jack tines are the only modifications made to the pallet jack, and the brackets can be left in place with no impact on operation or the footprint of the pallet jack. I recommend the use of lock nuts or Nylock nuts to ensure that the bracket-retaining bolts do not come loose in normal operation of the jack. Photo 8 shows the bracket in place on the rear of the pallet jack.

My installation uses M16 bolts for the lower strap connection. To make this a 'tool-less' installation, I welded thumb tabs on a pair of M16x50 socket head cap screws. The tabs are short enough that they do not stick out the sides of the jack footprint, and approximately 45mm wide, enough for me to tighten into place by hand. Standard hex head bolts could just as easily be used, and there is no requirement to make the fixing bolts tool-less as I did.

Stable when testing

As noted earlier, a load of about 2kg on the boom tip was enough to topple the unit when the straps were not connected. However, with the straps connected to the brackets, the crane should be able to perform at original design capacity — typically two tonnes. At the time of writing, the heaviest load I have lifted has been just over 350kg, and the unit was quite stable through all motion tests (Photos 9 and 10).

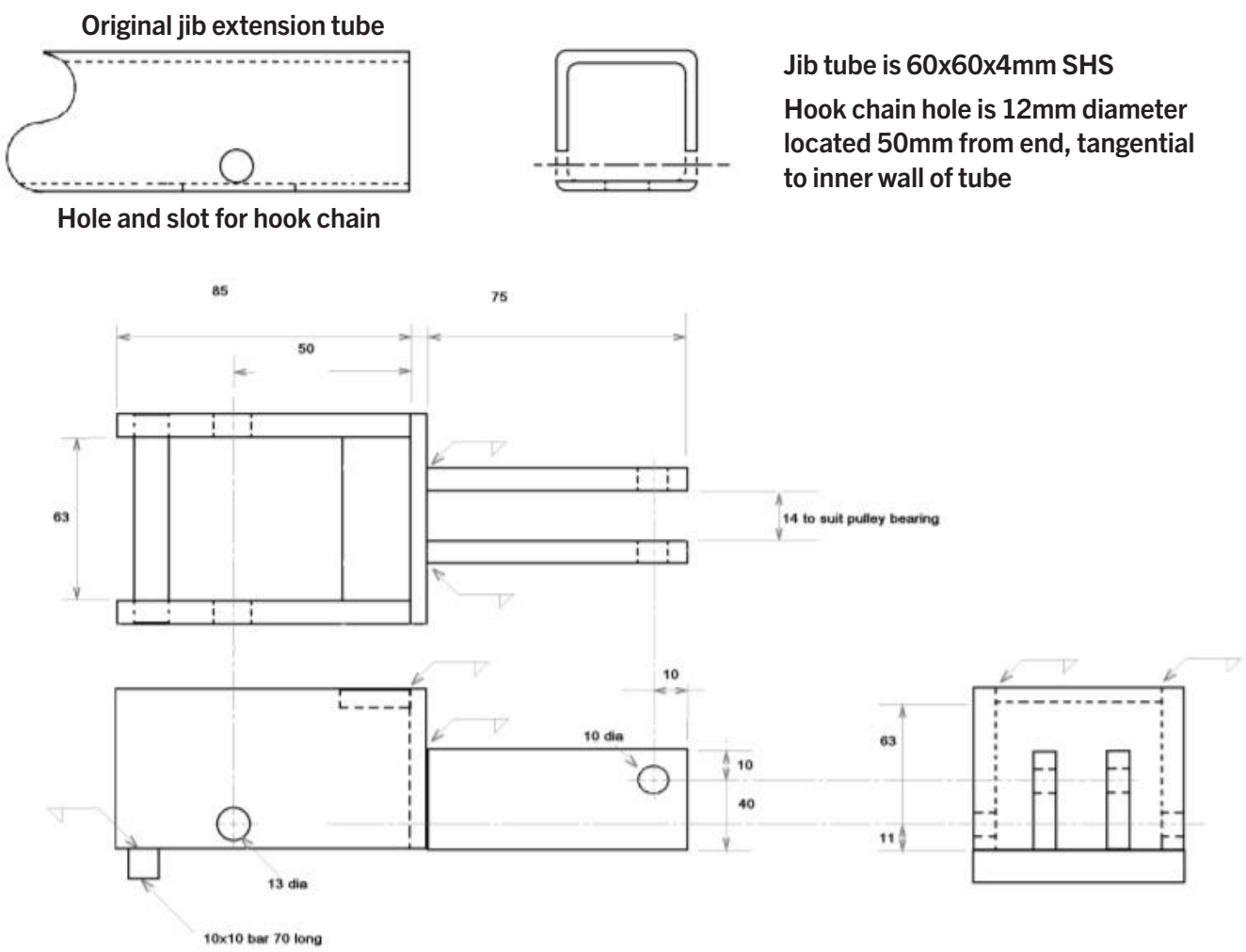
Note: steps five and six are about the addition of a winch to increase the versatility of the unit. These additional steps could be considered optional if the range of motion required is already met with the hydraulic jib and pallet jack movements. The other advantage of the winch installation is that I can use the winch independently of the hydraulic lifting, allowing me to utilise it for trimming a lifted load for alignment should the situation require it. ▶

The heaviest load I have lifted has been just over 350kg, and the unit was quite stable through all motion tests

Photo 11: The 500kg brake winch allows an additional level of control over lifting, or angling loads

Photo 12: The second hook from the winch allows load trimming, or different control over lifting

Sketch 4: Critical dimensions — jib



The hooks can be clipped to a loop mounted on the side so they aren't flapping around when the machine is in storage

Step five: The nosepiece

This is a fabricated piece that is a slip fit over the end of the extending boom section of the jib. In most engine cranes, this is an SHS piece with a single bolt and slot arrangement to connect the hook chain to the crane. Since I utilise this bolt-hole to retain the nosepiece, some measurements need to be taken from the donor crane.

The fabrication is simply built up around the SHS, with a suitable clearance — I added a couple of millimetres. The pulley sheave from an exercise machine was used to redirect the winch cable, and a pair of stand-off pieces was made to support the axle bolt. I positioned these stand-off pieces so that the pulley rim sat approximately 10mm above the top of the nosepiece and the cable would not rub on anything along the path of the jib. Photo 11 is a good overview of this piece.

The original hook chain bolt may need to be replaced with a longer one to compensate for the thickness of the cheeks of the nosepiece. I have supplied drawings of the nosepiece I made with dimensions that suited my donor crane. You will need to determine any adjustments to suit your crane and pulley dimensions. See Sketch 4.

Photo 13: This device is commonly used in my shed for lifting materials or equipment and has been used to upend my welding table for some modifications I made. No more back aches or hands pinched under dropped chucks

Guard

You will see in Photo 12 that I also fabricated a two-piece guard, which provides a cable guide between the winch and pulley sheave and then forms a cover over the pulley sheave to prevent the stiff winch cable from rising out of the pulley when unloaded. The hooks can be clipped to a loop mounted on the side so they aren't flapping around when the machine is in storage.

This guard is retained by the same hook chain bolt and both pieces are mounted from the same side to make it easy to fit. I have not included any sketches of these guards, since they were simply fabricated on the fly from a lightweight galvanised-iron sheet.

Step six: The winch base

I selected a 500kg winch and made up a baseplate to suit it, ensuring that I did not utilise any mounting holes in the centre line of the baseplate. My baseplate was 140x100x6mm mild steel (MS), with 4x10mm holes for attaching the winch. Check your winch to ensure that it is pointing the right way — most winches are marked with the direction in which the cable should operate. This is particularly important with any type of brake winch.

I then determined the angle on which to mount the winch so that the cable would not rub on the jib/boom at any extension setting. I did this by holding the leading edge of the winch against the strap and lifting the back edge until the cable was clear. I measured ▶

Notes on use of the device

Someone asked what it's called. I call it a 'bitsa-crane', since it is bits of an engine crane, bits of a pallet jack, and bits of a winch, plus whatever else I add for the lift.

I found that I gained 3mm for each 'click' of my winch and could get very fine control using a combination of the hydraulics of the jib ram and the pallet jack. You will quickly develop the habit of paying out the winch cable before attempting to extend the boom; otherwise, the cable will restrict movement.

I used a maillon (aka quick link) to attach the hook to the thimble of the winch cable. This allows me a high degree of flexibility to change the hook for some other lifting device to suit the job at hand. Equally, a maillon or shackle could be used to change the hook on the hook chain. Remember that all components of a rigging set-up should be rated for the load — including a safety margin. The failure point will be the weakest link, and that link could be parts of the bitsa-crane, or it could be a weld on the load, a rope, a sling, a bolt, or any other component in the load path.

the lift and used that as a ‘rise versus run’ to determine a starting angle. The determined angle was then offset by an additional distance to allow room for bolts, tools, and welding operations to occur between the plates, which will be above and below the centre web piece. I made a wedge-shaped piece to go between the baseplate and the tension strap on the top of the jib.

Clamping plate

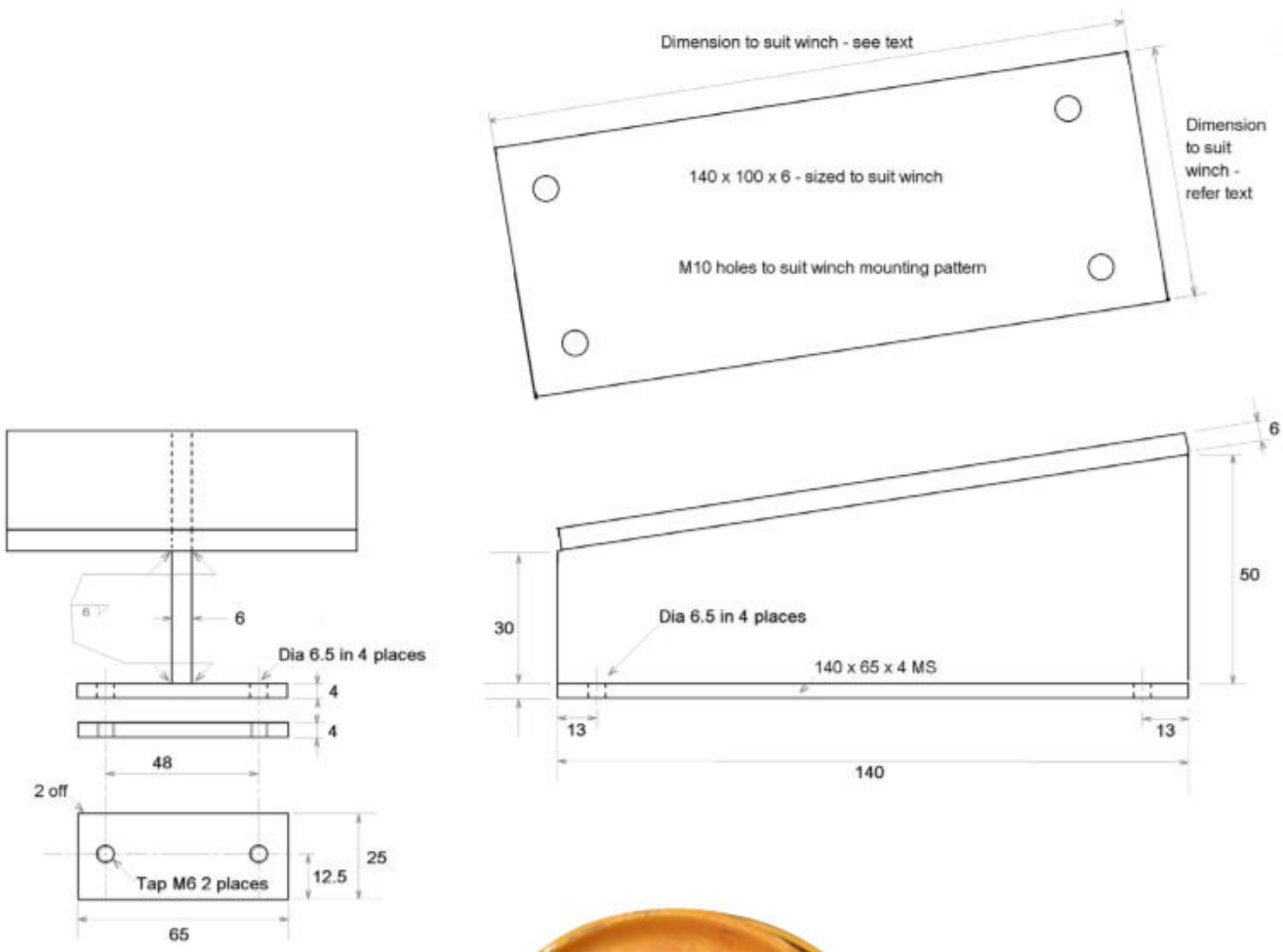
The strap on my crane jib is 40mm wide, so I made a clamping plate from 140x65x4mm MS, with 4–5mm clearance holes as pairs spaced 13mm from each end of the plate with a 48mm centre to centre between each pair so the 40mm strap could pass between the bolts with a small clearance (see Sketch 5). Two matching straps were made from 25x4mm MS strip in 65mm lengths with M6 tapped holes on the same 48mm centre spacing. The wedge-shaped web was welded to the centreline of the plates with a fillet weld on each side of the web.

> I call it a ‘bitsa-crane’, since it is bits of an engine crane, bits of a pallet jack, and bits of a winch, plus whatever else I add for the lift

After being cleaned up and painted, the winch base was mounted to the top strap of the jib using four short M6 bolts. It was then bolted in place using the appropriate-sized bolts — M10 in my case. The cable was paid out through to the pulley sheave and a hook attached to the thimble eye. Photo 14 shows the conclusion of mounting the winch.

That completed the fabrication of all the components. All parts were primed, painted, and assembled for use. (The completed device is shown in Photo 13 on the previous page.)

Sketch 5: Winch base



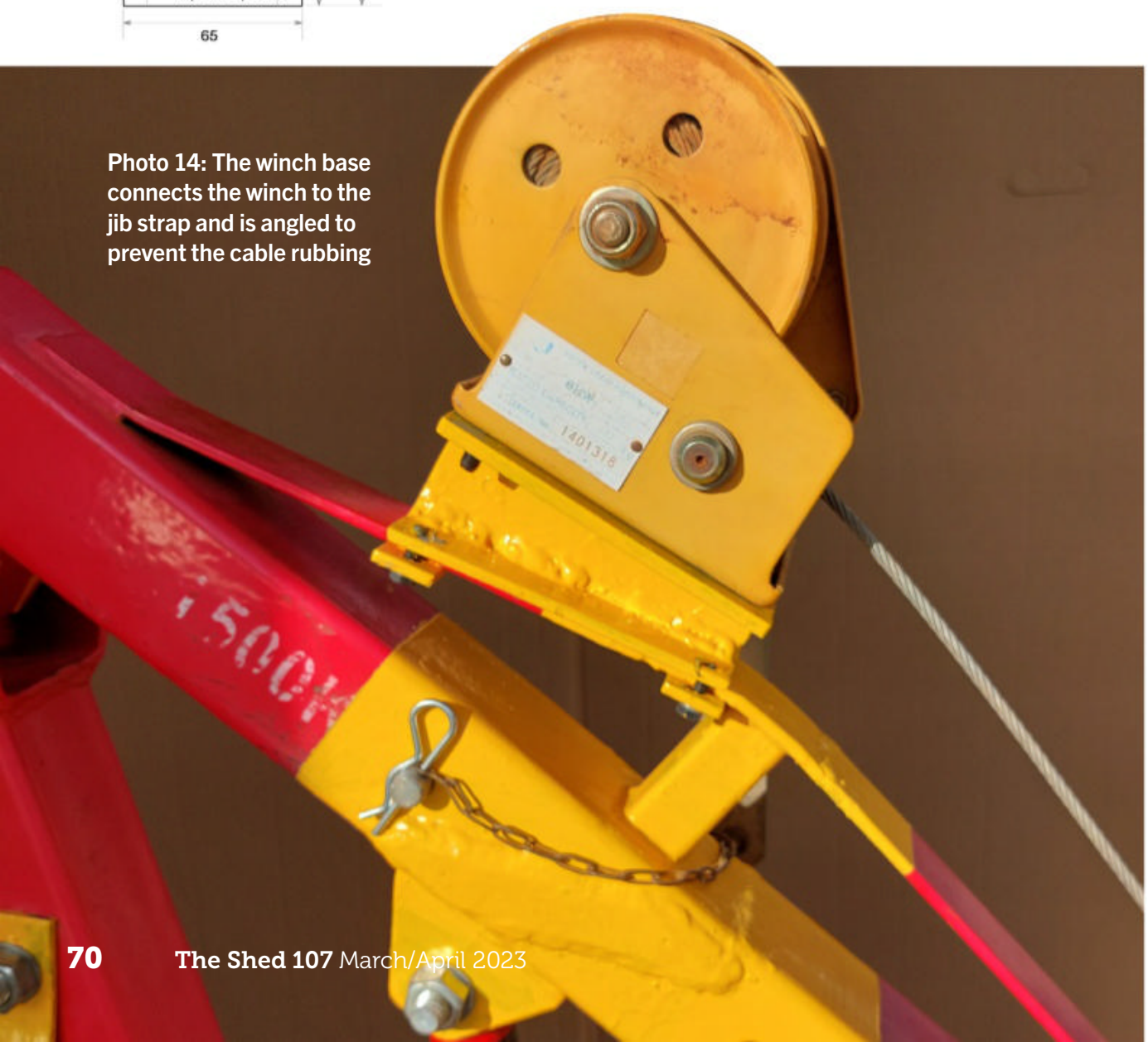


Photo 14: The winch base connects the winch to the jib strap and is angled to prevent the cable rubbing

Rules for use

The original crane manual — or various online copies — outlines guidelines and rules regarding the use of a “short as possible” boom extension and keeping the load within the footprint of the crane to avoid toppling. These guidelines apply to all lifting arrangements, and this device is bound by those as well.

Always ensure that the jib boom is locked in place with the cross pin as originally supplied. These typically come with a wire R-clip to lock the pin in place. I added a short length of chain between the pin and the R-clip so I couldn’t lose the clip.

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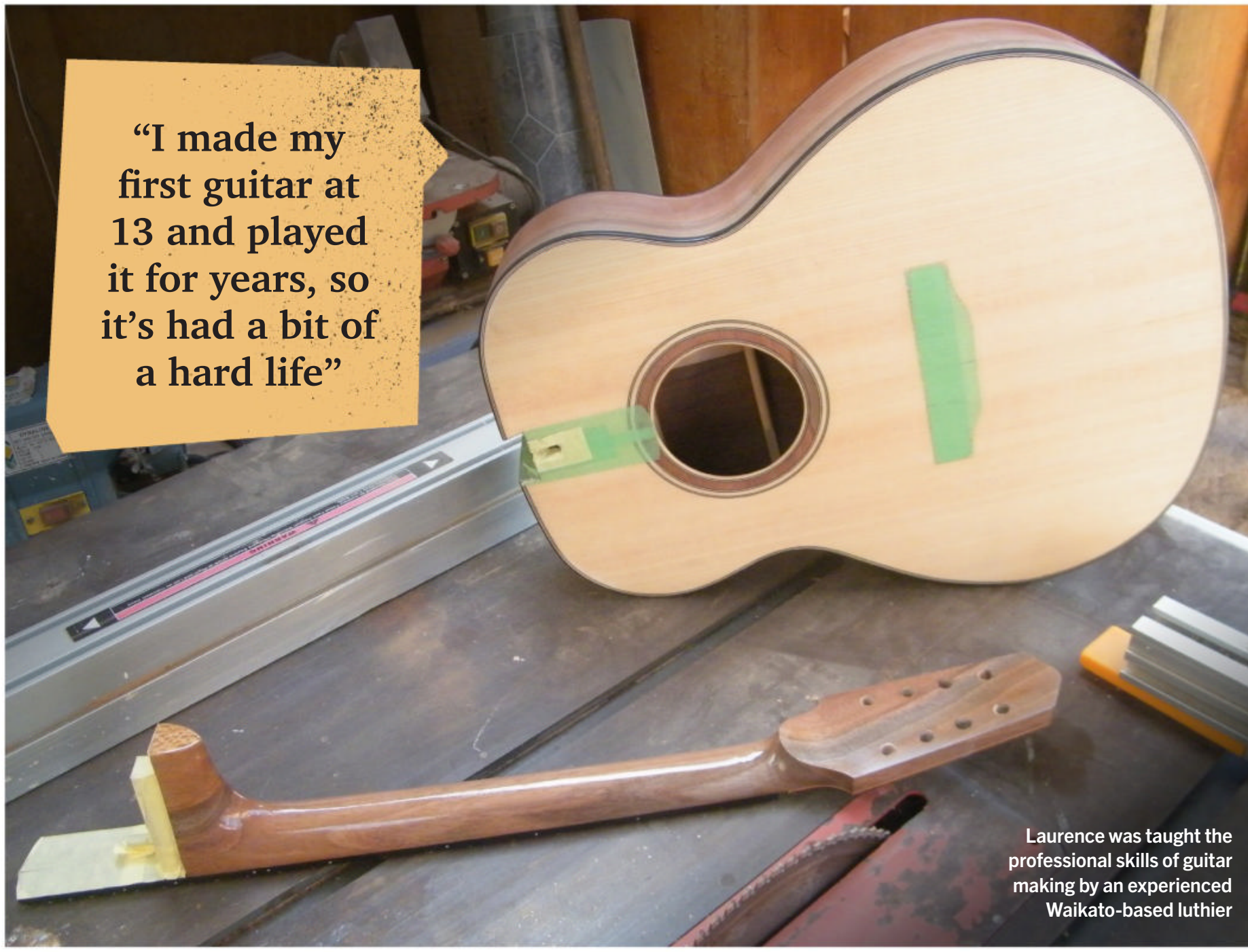
MUSIC MAKERS

Two Waikato men have turned their love of music into works of art in wood

By Geoff Lewis
Photographs: Geoff Lewis

Laurence with the finished product



Laurence was taught the professional skills of guitar making by an experienced Waikato-based luthier

Luthier, or guitar builder, Laurence Frangos-Rhodes has never been far from music or musical instruments. Now 20, Laurence and his two younger brothers, Sam aged 18 and Nate aged 16, are members of the home-schooled Frangos-Rhodes family.

About 10 years ago, Laurence was initially tutored in guitar by well-known Waikato folk musician Julie Pescud, before moving to Pitt Ramsay, equally renowned in the blues scene. Laurence is a member of family band RhodeWorks, which has performed in many house concerts and at folk and bluegrass festivals around New Zealand and in Australia.

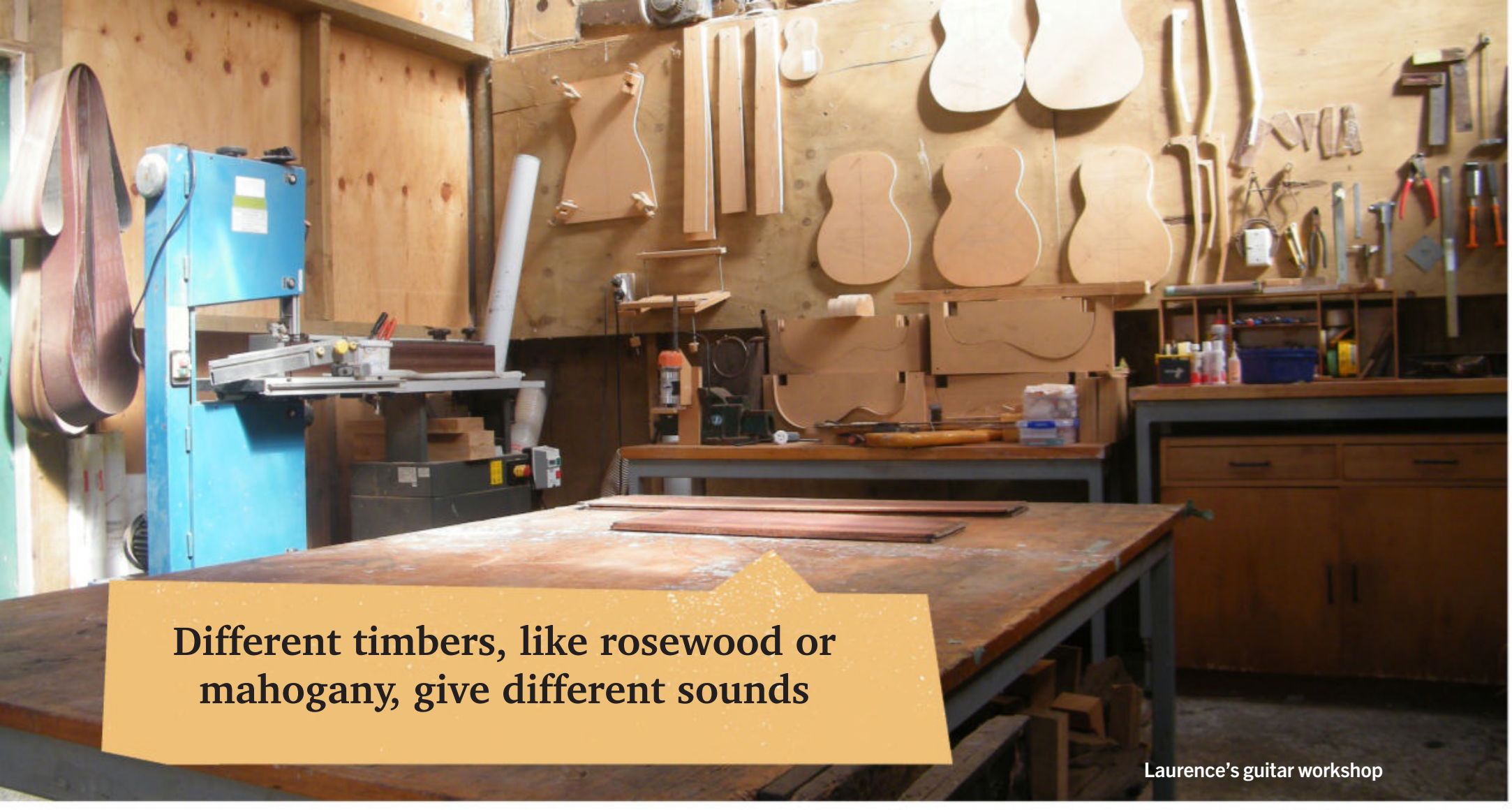
More recently he has joined his brother Sam, Kim Bonnington, and Nat Torkington in the band You, Me, Everybody.

Laurence was taught the professional skills of guitar making by experienced Waikato-based luthier Johan van der Gaag.

He says, “I made my first guitar at 13 and played it for years, so it’s had a bit of a hard life. We work around the festivals and jam sessions, where I try to sell my guitars.

“I play my own instruments, mostly full-sized six-string based on the Martin design. I like Martin designs. I do everything from the Dreadnought full-sized to 0 scale.” ▶


Fitting the purfling



Different timbers, like rosewood or mahogany, give different sounds

Laurence's guitar workshop

Custom request

Laurence likes the sound and the style of guitars made pre World War II and played by such greats as Django Reinhardt.

"I'm going for the vintage tones," he says. "I have been experimenting with different bracing designs to try to get the perfect combination of strength and tone. They all have their own character."

One day, a customer asked him to build a guitar in that '30s style. To do it, Laurence needed to find specialist timbers. When it comes to wood, he is a stalker and a hoarder. Even old timber furniture can yield nice pieces and gets stacked in the corner of his workshop with other well-seasoned blocks.

In Laurence's quest for the right timber to build the custom guitar, it was a matter of luck that he obtained access to a supply of Brazilian rosewood, an almost unobtainable species that can cost moonbeams even for entry-level pieces.

"The customer who wanted me to make the guitar had bought the timber in Australia, where it had been stored for about 40 years," he explains. "It was dry and hard. He had brought three six-inch-wide, one-inch-thick planks, each around 1m in length."

A press used to form the top of the guitar

International rules

Getting the timber to New Zealand wasn't without its challenges, as specialist timbers — even those that are 40 years old — have to be 'Cites' certified. 'Cites' is the UN Convention on International Trade in Endangered Species, which include specialist timbers.

"I was in Australia to pick [the timber] up, but it turned out the certification doesn't last very long. When we got it to the airport, we discovered the paperwork had expired," Laurence says.

Back in his workshop, having surmounted that bureaucratic tangle, Laurence set about the hair-raising business of reducing the 25mm planks with a bandsaw into slices that were 3mm and 4mm thick, suitable for the body of a guitar — about four pieces from each board; two sets of sides and two pieces for the backs.

The guitar's rosewood sides and back are combined with a top made of Adirondack spruce imported from Old Standard Timbers in the US.

"It's about $450 for the top; it isn't cheap," Laurence reveals.

The pieces are glued together using traditional animal glue, which is similar to gelatin. Melted in an old rice cooker, it requires fast work.

Differing tones

Different timbers, like rosewood or mahogany, give different sounds; tops are usually cedar, and Laurence has also used London plane and black maire — the New Zealand equivalent of rosewood with a similar density.

For the first of his '30s replica guitars, Laurence used the Brazilian rosewood; for subsequent instruments, he has used comparable rosewoods from Madagascar and India.

"It's full of resin. If you run it through the sander it very quickly turns to goo," he mentions. "It is a struggle to lacquer; the colour can bleed out if you're not careful. I use ivoroid binding to cover the joints and protect the side from splitting."

Commercially bought purfling back strips are moulded using acetone to provide added protection and finish the edges.

Laurence will work with any guitar player, from beginner to professional, to create an instrument suited to their likes and needs. The sizes and types of 'tone woods' used are often determined by the end use.

"First, I'll talk to them and we'll decide on the body style and then the sound they want. Hardwoods can give a glassy sound and can be a bit harsh for some people. I use a lot of German spruce for the backs and sides, which gives a warmer tone. It also wants to be nice and easy to play," he explains.

Laurence also has options for electric pickups that can be fitted to acoustic guitars.

Styling himself as Limehill Guitars, Laurence considers his guitar making to be a hobby at the moment but he'd like to get production numbers up and make a living out of it. ▶

Rosewood strips of 3mm and 4mm

Laurence showing the inside structure of the guitar

Stewart Stanbridge with wooden bugle and Keith Day on cornet

Tubing forms in MDF

Tubing in wood

Wooden bugle?

Former transport police officer Keith Day likes to blow his own trumpet — although in this case it's a bugle.

Keith has lived in Hamilton for 34 years and retired from the force eight years ago. Looking for something to fill all his new spare time, he discovered the city's Men's Shed, a group of mostly woodworking enthusiasts shoehorned into a room in what had been the city's electricity department workshops.

"I had done some woodworking when I was at school but that was about the end of it. It wasn't until I decided to join the Men's Shed that I was introduced to wood turning," he says.

Keith is also a musician, a brass player for the past 22 years with the local Salvation Army band. The 26-member band provides entertainment in the community. Keith currently plays a 'baritone' — a brass instrument that fits somewhere between a bass and a cornet.

Thus, Keith's two interests came together and he set about building a bugle — of the kind used in the cavalry charges of old. However, Keith's would not be made of the usual brass but of wood.

"I was looking around for something to make that was a bit different. One day, I came back from (band) practice and decided to make a bugle," he explains.

The wooden bugle is playable and has a mellow tone, but it requires rather more puff than the metal instrument

A cornet template

Keith needed a model to work from, so he borrowed a spare cornet from the band inventory. A cornet is similar to a bugle, but with valves.

"I took it home and measured the curves," he explains.

However, while the technology to bend metal tubes is well known, creating curves from wood is a different story and required innovation.

"I cut the tubing in two halves in MDF with a router and fitted them together; I was learning as I went along," Keith admits.

Ultimately, the bugle was made of five types of timber and took about two months to finish.

The wooden bugle is playable and has a mellow tone, but it requires rather more puff than the metal instrument.

Keith decided to donate the wooden bugle to his band-master, Stewart Stanbridge, a well-known figure in the New Zealand concert-band world, and made a special stand for it.

"I'm just one of those old guys who doesn't know the word 'can't'. I always have ideas," Keith says.

Keith's next challenge is a trombone made of wood — probably oak. It will have a valve and slide about 1.5m long.

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COUNTING BLESSINGS

Mark finds that not all pots of gold are found at the end of a rainbow

By Mark Seek — seekandthrive.com

Plimmerton was the location chosen by my wife for us to celebrate our wedding anniversary of some 33 years.

Often, on our way to catch the Interislander ferry, we would comment on how nice that area of Kapiti was, but we never took the time to stop — always in a rush to get to the terminal on time, and I just hate travelling full stop.

Plimmerton offered colourful boat sheds, adjacent to some of the city's more congenial beaches, a couple of thrift shops for the wife, and one of the best fish and chip shops in Kapiti.

To be perfectly frank, I needed a break away from the hectic work schedule of hospice counselling. My wife noticed I was getting a bit grumpy and short-tempered. She was right! My emotional tank was empty, and some. When others are affected by our mood, it is time to do something about it.

Refilling the tank

Can I suggest the obvious benefits of a weekend away, or maybe it is time to pick up a new hobby, throw in a few random picnics, even get that old surfcaster out — and turn that phone off. I suggest there are limitless ways to fill up.

Going back a few years — and not forgetting my inability to see the proverbial brick wall before I ran head on into it — things were not that great. I was working long hours, not paying close attention to my health, and ignoring symptoms of fatigue — you get the picture. Hindsight is a wonderful thing.

The Airbnb booked, we set off on the Friday morning. The drive from Hawke's Bay provided us with some pleasant motoring, which went without a hitch.

Modern cars are good for that — no need to go around and tighten up every single imperial nut and bolt to prevent important parts falling off. There have been numerous times I have had to replace tail-light lenses on our ageing '65 Healey Sprite. They seem to have an uncanny habit of vibrating loose and catapulting themselves into the Bermuda Triangle, never to be found again — not in my lifetime, anyway.

The host seemed nice

When we arrived at our destination, we met the bloke who was going to be our host. He seemed a nice and genuinely friendly sort of fella; I gave him 10/10. The small farm property where we were going to be staying was outstanding. We wandered around later in the evening and introduced ourselves to the host's Highland cattle, a rustic breed that originated in the Scottish Highlands. They have huge horns and a shaggy coat and are quite immense and imposing up close and personal.

Not your average farm cow, is it?!

Your columnist feeling chuffed sitting astride this classic HD

The next day dawned. We had decided we would head off in the general direction of Paekākāriki — on the road early meant less traffic, avoiding all those Wellingtonians heading out of the city. We were awoken by the roosters roostering, or whatever they do. We went downstairs to grab a quick bite to eat 'a la continental'.

Breakfast was going well until the host — whom I had thought was a good bugger — decided that he would like to show us around his farm sheds, his "little museum" as he put it, after brekkie. I could feel my eyes glaze over — boring!

Management speaks

I immediately looked at my wife and, using sign language, indicated 'No way; not on your nellie! Not interested; don't you dare!' I was panicking now. This was not my plan for the morning. I had absolutely no interest in hay-making machines, ploughs, and other boring implements used on farms. My wife, however, was all enthusiastic and chirpy — yes chirpy!

Who is chirpy this early in the morning? I thought to myself — but she was on holiday. She was nodding enthusiastically and agreeing that we would both love to have a little tour of the place. I could see this was going to be a long, painful morning.

Bugger me, I thought; time for me to be very tactful and diplomatic, but my brain had obviously gone fishing because, as I opened my mouth, nothing came out. I put that down to the copious cups of freshly made coffee, home-cured bacon, and free-range eggs. *Sneaky bugger,* I thought to myself. *He filled me up with the fancy breakfast just so we'd agree to looking in his shed.*

My wife is a sucker for museums; she is also very polite. I could see I was not going to win this one so, with much resistance and very reluctantly, I agreed to a brief glimpse of his museum.

OMG

Later in the morning, we headed down to a barn that, I must admit, did look rather impressive. Our host unlocked the big barn doors and proceeded to open the place up. What was presented to us can only be described as jaw-dropping. My wife said that I went all pale, and I remember feeling my knees go like wobbly jelly.

What was presented to us can only be described as jaw-dropping. My wife said that I went all pale

Inside the barn were dozens of fully restored Harley-Davidsons — rare as rocking horse you know what! That's right, not a rusty old plough or hay-making machine in sight; no, just motorcycles. I thought I was going to kiss the little bugger. Obviously, I tried to remain cool, calm, and collected, but the expression 'kid in a sweet shop' would have painted an honest picture of me standing there, quite taken aback.

Never in my wildest dreams could I ever have imagined such a thing existed out here on some random farm. Turns out that this bloke had been restoring them one by one with his late father. They were true enthusiasts, and that he wanted to share these with us was exciting and truly an unforgettable experience. We were guided through the vast rooms — yes, rooms. Each had its own Americana theme, with collectable memorabilia on the barn walls. It was clear that this man was a very clever bloke. I was given the opportunity to look at his collection for as long as I needed to; he said he would leave us to enjoy ourselves and headed back to the house. I cannot tell you how humbled and privileged I felt.

One lucky man

Here I was with my beautiful wife, sharing with her one of my passions: motorcycles. What an incredible morning we had together. I learnt something valuable that day. First, listen to your wife; she probably knows something you don't. Second, sheds can often be filled with all sorts of treasures — I should have known that! Third, if a bloke offers to show you around his shed, do not be a dick like me; accept the opportunity wholeheartedly.

The weekend away from the patients and families of Cranford Hospice offered me the renewed vitality necessary for my role. I shared the barn experience with several of the blokes over the following weeks. They all said that they could tell I had been refreshed and commented there was a bit more bounce in my step. I recognised that being with my wife all these years was something not to be taken for granted; I needed to celebrate our friendship and companionship because I am one lucky bloke — she told me to add that bit, but she is right; I am.

Note to self: Do not take for granted the following: family, friends, health, and well-being.

TREADLING LIGHTLY

The rabbit hole of planned obsolescence

By Murray Grimwood
Photographs: Murray Grimwood

Time is a great judge of quality. Long after the worst are gone, the best remain — sometimes hiding right under our noses. I recently bought — completely unwittingly — something that qualifies as 'best'. Then, in planning what to do with it, I completely forgot the first rule of off-grid life, which is to simplify.

It took my better half to point this out, in her inimitable way.

Not only was she right, but her suggestion led to a happy few hours of work and learning, plus a sense of satisfaction with — and respect for — a lovely little piece of machinery. Let me tell the tale of a wet weekend and a gem discovered …

It turned up at the auctioneers: a nice little table with a sewing machine attached. It wasn't the kind of machine I gravitate towards; my tastes tend to start and finish with those old black-and-gold treadles, but I thought the table looked useful. I was the only bidder.

When the cat's away

The next day was a rainy Saturday, and she who can be a little prone to asking why I'm wasting time was away, so I hurried it from car to conservatory, refilled my coffee, pulled up a chair, and surveyed what I'd bought: an aluminium-bodied, straight-stitch Singer, belt-driven by a BAK motor, missing its thread tensioner and some of its guides, with a stripped clutch screw and a closing-table-chopped power cord, just about sums it up. It had a knee-operated speed-control arm, which pushed the optional foot control when the latter was stored in the table. Intriguingly, along with the original handbooks, there was a brand-new drive belt for a treadle machine.

> I had pulled the motor apart, trimmed the brushes, and reassembled it with an eye to seeing if it ran

By the time she came home, I had pulled the motor apart, trimmed the brushes, and reassembled it with an eye to seeing if it ran.

After I explained what I was doing, she said — this is the aforementioned 'inimitable way' incident — "But we already have a good electric sewing machine; how about we finish what we started years ago and get the treadle one going?"

Hmmm; vague memories of assembling one machine from two, of a job not finished for lack of a spring, or something like that.

Good things take time

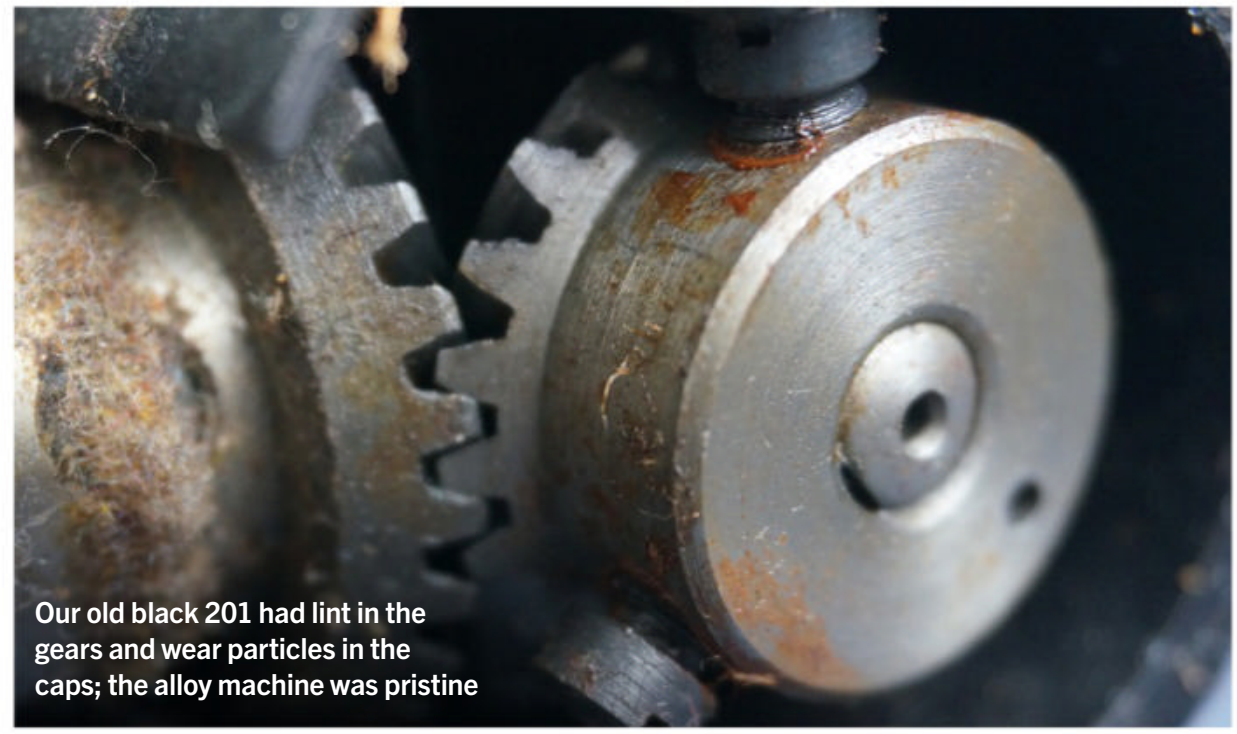
So, for the first time in eight years, I opened up the old treadlie. Just out of interest, I removed its tensioner and found that it fitted into the aluminium machine perfectly. So, too, did its clutch screw. It also looked as if this newer machine could be treadle driven, meaning that I had to make a choice.

Onto the net, typed in the serial numbers, and both machines turned out to be 201s; I'd known the manufacturing date of the oldie — 1952 — but not the model. The alloy version was produced from 1954. Delving deeper, I found not only that they share internal mechanicals completely but that 201s were the top of Singer's range; their Rolls-Royce offering that, according to some, has never been bettered for stitch accuracy or smoothness.

The 201s are visually identifiable by the combination of their circular forward/reverse plate, plus the numbered tensioner to its left, both facing the operator. Verification is guaranteed by sighting the two circular gear-caps underneath.

Interchangeable bonus

A quick measure of base dimensions, pulley placement, and hinge spacing confirmed that these machines were indeed interchangeable; same mechanicals, same footprint.



Our old black 201 had lint in the gears and wear particles in the caps; the alloy machine was pristine

Their Rolls-Royce offering that, according to some, has never been bettered

The best of our treadle tables was the two-drawer one from an earlier, 1947 parts donor. Choosing which of these machines to mount in it came down to aesthetics and condition. Aesthetically, I was beginning to warm to this new baby. Condition-wise it was like new: no discernible slop, no tide-marks on the shafts, and — unlike the older black one — no wear particles in the dust-caps. The paintwork was near immaculate.

Reinforcing this impression, there were paper towels spread underneath the machine to catch surplus oil, suggesting someone who oiled and who wasn't averse to an extra drop. The choice had just made itself.

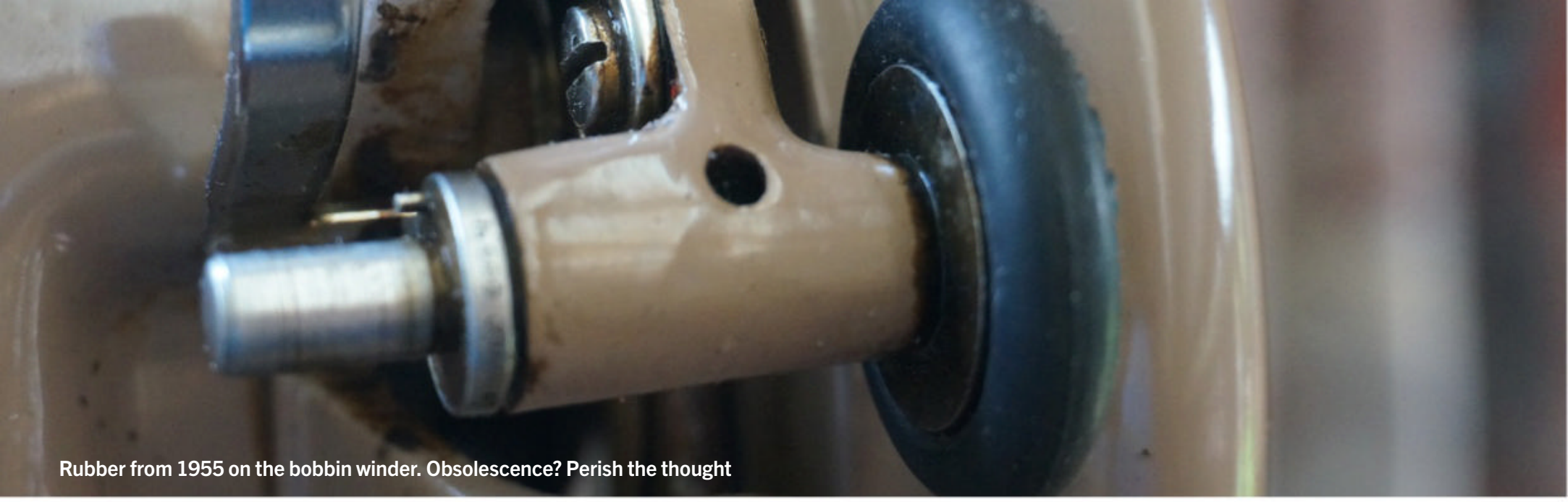
There are 14 parts to the gorgeous little tensioner

Like a dog with a bone

Saturday night I was a tad antisocial, glued to the screen and on a learning curve. I learned that 201s first hit the shelves of Singer shops in 1935. I learned that they cost six months' income for a seamstress back in the day, and that without hire-purchase most folk wouldn't have been able to afford them. I learned that free in-store lessons were part of the deal, but — and maybe Singer was cynically counting on this — those who bought a 201 tended to be professional machinists and seldom availed themselves of the offer.

The need for seamstresses to comply with requested stitches-per-inch probably led to the calibrated forward/reverse control, with its simple but elegant gate ensuring that reverse stitches were the same length as forward ones. The same market demand was probably behind the drop-feed thumb-nut, allowing free-motion embroidery and darning.

Mostly, however, I learned about the three pairs of gorgeous little bevel gears, and the silky-smooth running they gave, and the costly hook ring, which nobody has bothered to emulate fully since. ▶



Rubber from 1955 on the bobbin winder. Obsolescence? Perish the thought

Recycled Spitfire parts

I also learned that the early alloy machines were likely made from recycled World War II aircraft — how to own part of a Spitfire — and about the cheaper, increasingly plastic ones, which undercut this expensive-to-make piece of exquisite engineering, production of which eventually ceased in 1961. I learned that 201s are close to industrial strength — there are tales of them sewing through six layers of suede — and if you keep below that level and keep them oiled, they will last forever. I was sold; this thing was going to be worth putting some effort into.

Sunday — the part that wasn't spent loading up the *Paper Tiger* (catamaran) and taking it to and from a cancelled race — was spent stripping machines from cabinets, cleaning, oiling, reassembling. I couldn't stop myself from turning the alloy one over as the oil penetrated long-dry surfaces; silky just kept getting silkier and, as I got my ear in, the places still needing oil started to become audibly identifiable, albeit in whispers.

Wonderful engineering

As legend has it, Singer specified that those wee gears be oiled rather than greased because there wasn't clearance for the latter. It's a lovely story, one I'm tempted to believe; sure we see — or don't see, because we never have to work on them — similarly exact engineering in the likes of our car camshaft mechanisms, but the 201's perfection was old-school journeyman produced. Not just the metalwork, either; in its heyday, Singer employed up to 2000 cabinetmakers, and many Kiwi houses still display their work for its visual appeal alone. Working-class life in 1950s Britain may seem unenviable to our eyes, but they produced with pride, on the side of the Clyde.

One problem that we hadn't sorted years ago was the tensioner. It seems that we had ordered a new spring but hadn't inserted it. This time around, I watched a YouTube demonstration, then confidently disassembled and reassembled the whole thing. As Sunday drew to a close, I had the machine treadling nicely but not stitching — prompting more screen time.

> The early alloy machines were likely made from recycled World War II aircraft — how to own part of a Spitfire

The needles on 201s, uniquely, have their flat facing aft — away from the drive wheel — and are fed from right to left. Plus, this seems to be the only old top-loaded Singer in which the bobbins feed clockwise. We got all that sorted and bingo: stitches, with perfect top and bottom tension just a couple of tensioner clicks away.

The elegant stitch-length gate, ensuring the same length in reverse

I chopped down the now-unneeded motor mount to guide the LED cable

A satisfying weekend

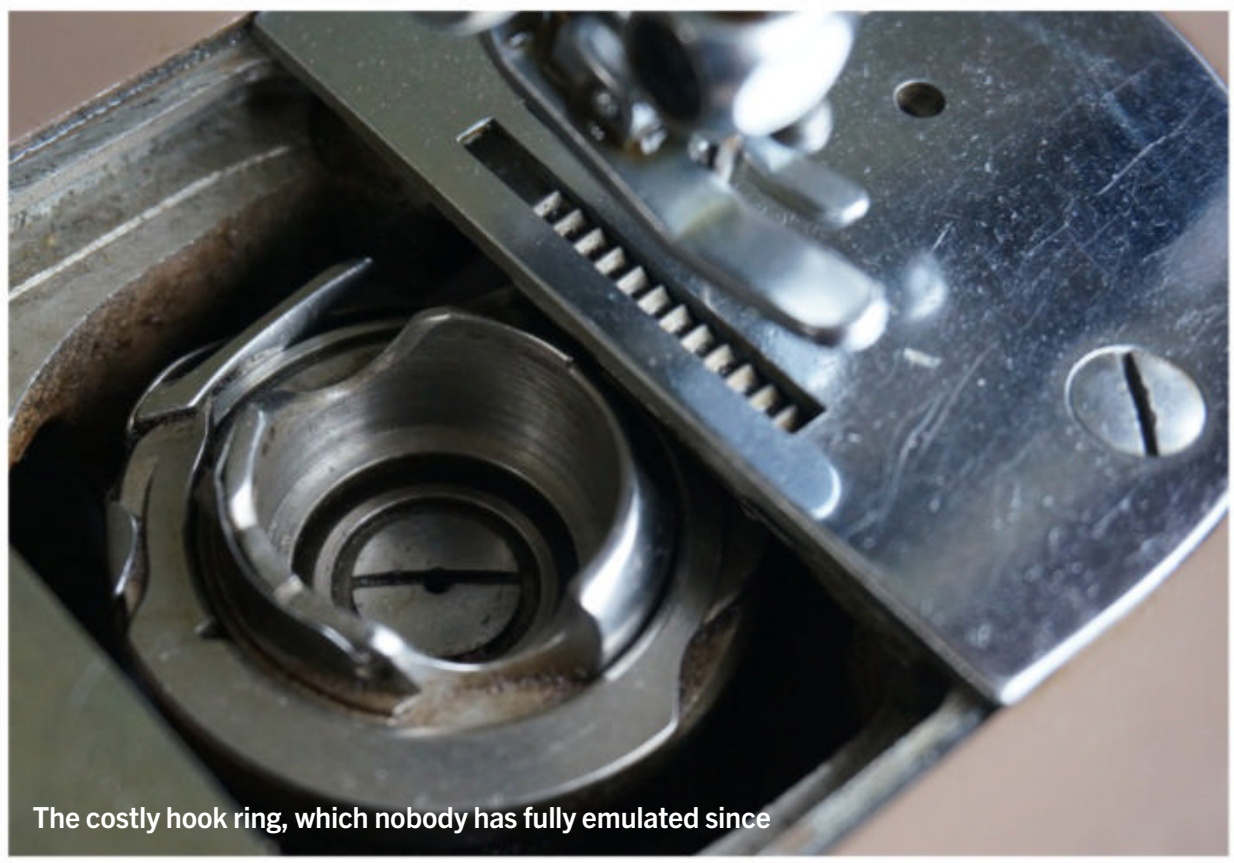
The finishing touch was to change the iconic Singer lamp from incandescent to LED. In the Commonwealth, these tended to be rear mounted; in America, they were mounted on the front — less glary but heat was an issue. Hardly earth-shattering, but satisfying nonetheless.

I cut down the unneeded motor bracket, using it to keep the wire clear of the drive belt, allied with a grommet through the table. I added a swing-out bobbin tray, packed the spare machine and parts away, and called quits on a satisfying weekend.

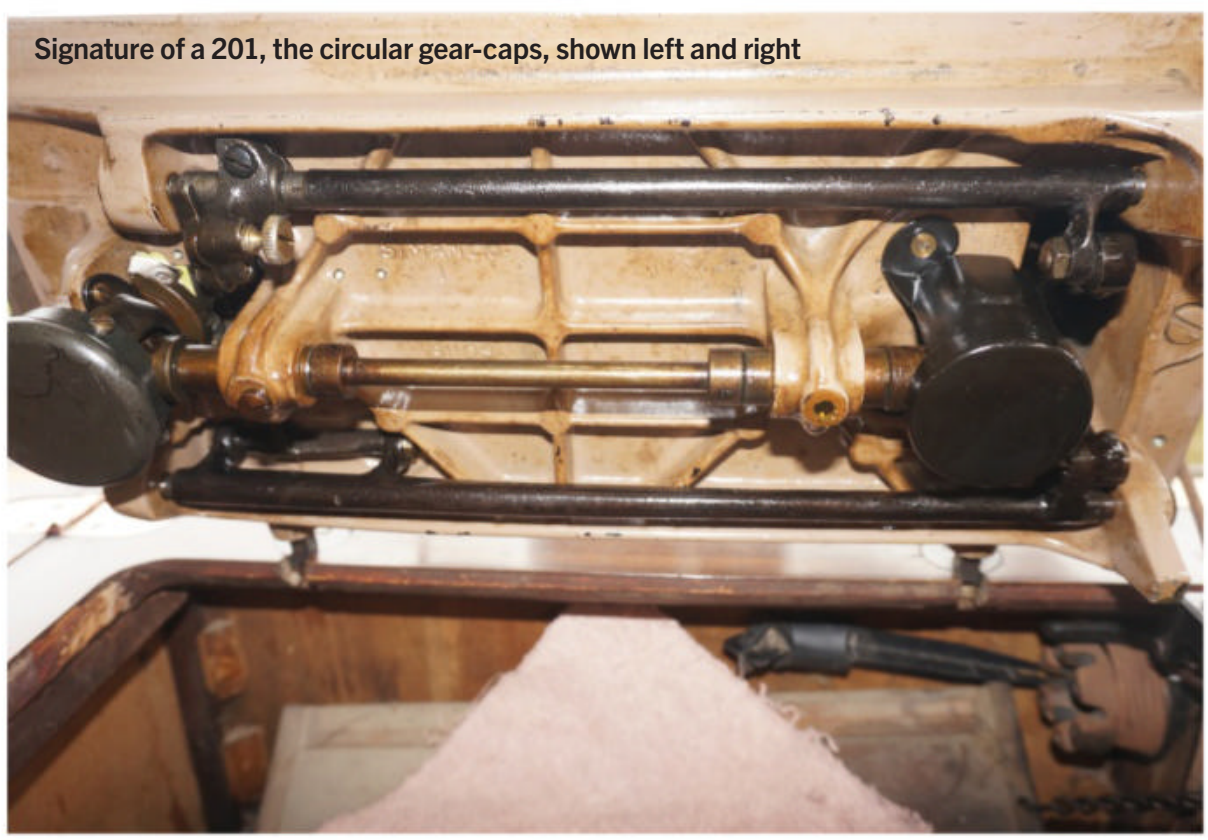
You can identify old Singers from their serial numbers, most of which make sense. 'K' means manufactured in Kilbowie (Clydebank, Scotland). 'P' means assembled in Penrith, Australia (but manufactured in Scotland — presumably a tax-dodging exercise). It is as easy to identify the when as the where; ours (201K No: EK 820---) was made in Scotland in October 1955 — nine months after I rolled off the assembly line myself. The machines were selling for 65 English pounds at that time. Current prices in New Zealand are a comparative steal, ranging from a few dollars to $300 for an as-new Penrith-assembled variant. I'm guessing ours was either sold in New Zealand in 1956 or brought out by an English emigrant sometime later — the former is more likely; travellers tended to bring portable machines, rather than table-mounted ones. ▶

From incandescent to LED

Every morning since, I've sat and treadled it for a bit



The costly hook ring, which nobody has fully emulated since



Signature of a 201, the circular gear-caps, shown left and right

Some were reputedly cast from melted-down Spitfires; there is arguably an aesthetic parallel


As the alloy one came home, and the BAK motor being assessed

Many will have adapted to treadling

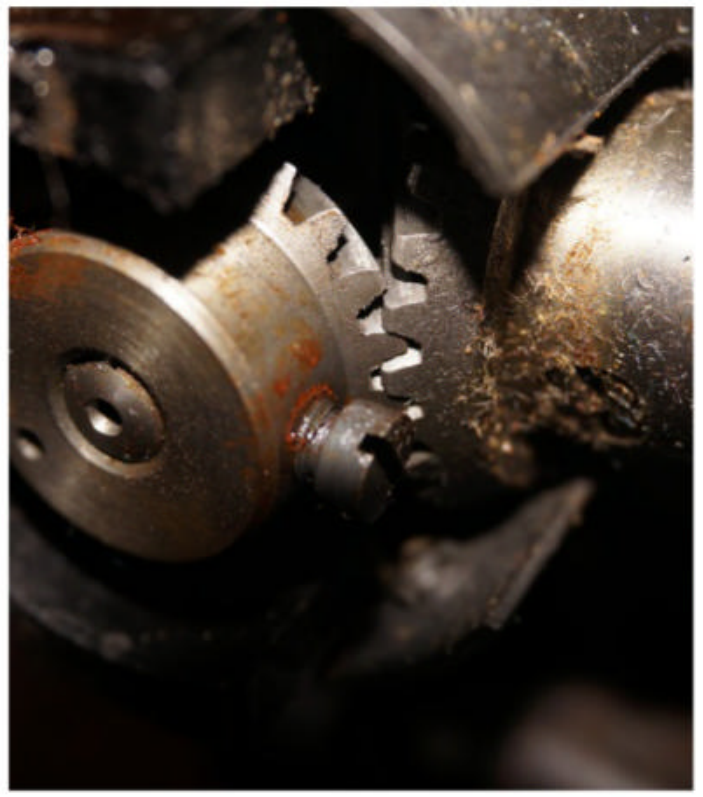
Most Singers from that era will accept hand-drive, treadle, or motor; dealers were more autonomous back then — due to distance and lag time — and would often mix and match for individual customers. Post–World War II, particularly, there were folk missing hands, arms, or legs, who ordered whatever worked for them. All alloy 201s seem to have been motor or hand driven as sold, but we are not the first, by any means, to adapt one to treadling.

Every morning since, I've sat and treadled it for a minute — just for the pleasure of listening to the silky silence, to what isn't there. It has made me think about noise and energy consumption, and how they go together; there is a good reason dragsters don't run silencers. Maybe that's a simple indicator of energy efficiency; the quieter the better? Whatever, I've formed a genuine respect for this little example of near perfection and don't plan on replacing it. Will it last forever? Probably, given that it has already outlasted its designers, constructors, sellers, and almost certainly its first owner, yet is barely run in.

We have lost sight of that way of thinking, of making something that is the best that can be made, with interchangeable parts and easy serviceability. Planned obsolescence was one of the deeper rabbit holes we have dug ourselves; we stitched ourselves up, yet the remedy was 'sew' simple.

I've formed a genuine respect for this little example of near perfection, and don't plan on replacing it

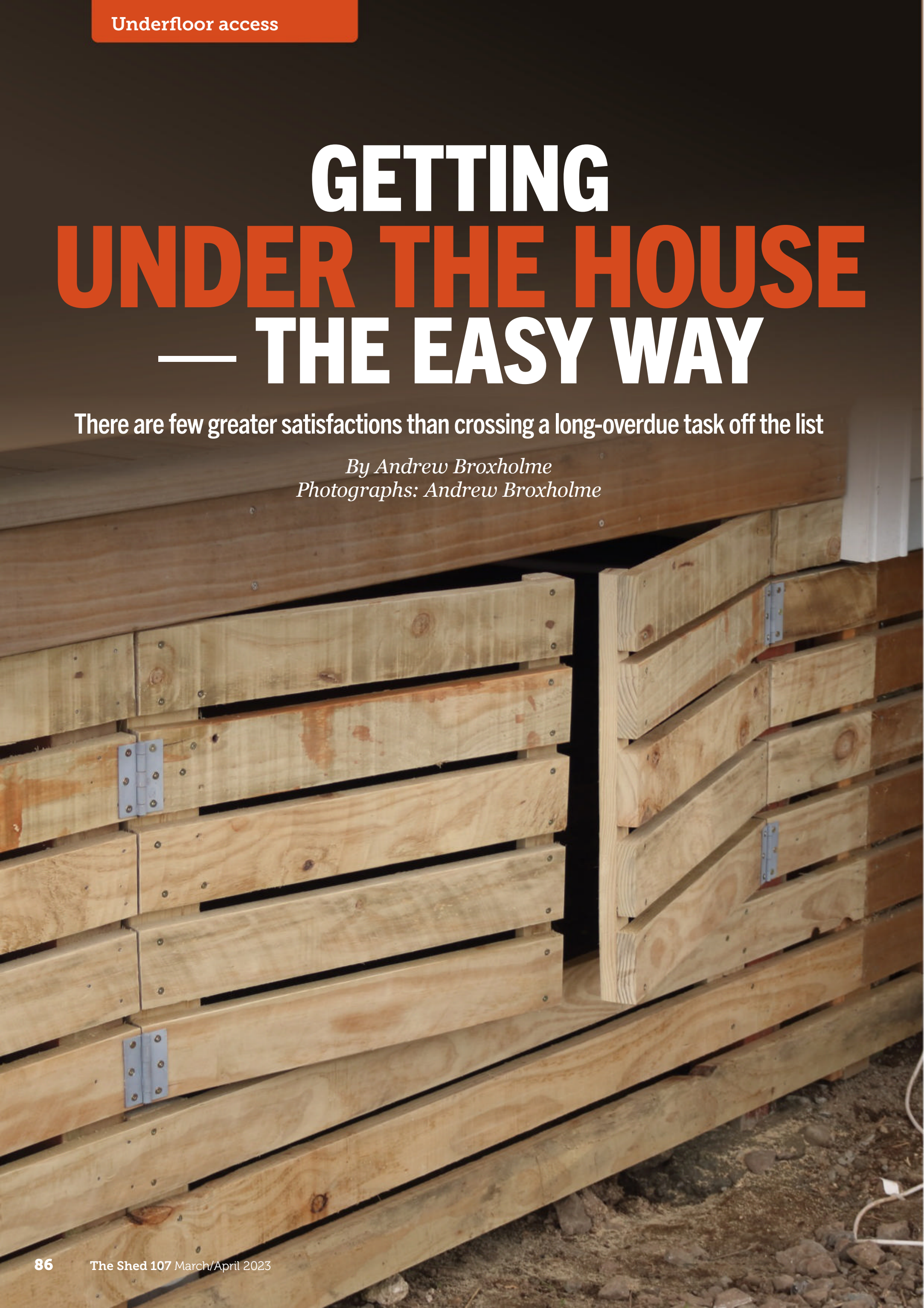
Our oldie — now relegated to spare-parts status



GETTING UNDER THE HOUSE — THE EASY WAY

There are few greater satisfactions than crossing a long-overdue task off the list

By Andrew Broxholme
Photographs: Andrew Broxholme



The door area with the door supports in place. The area outside is under the carport and will be concreted to about halfway up the higher of the bottom rails

Clever thought: why not build the door in place and cut it out later? I screwed what would become the internal frame of the door onto the inside of the baseboards using some thick cardboard as a spacer — about the thickness of a circular-saw blade. The clamp kept them seated firmly while they were attached

Like most sheddies, I have a list of jobs. Some are in my head, a few occasionally get written down. I'm reluctant to write a comprehensive list because it would be depressingly long, so I write lists of three or four things at a time and lately just try to get a few things done — or, more importantly, get a few jobs actually finished.

If I have one bad habit, it's that I have lots of things on the go. Things get mostly done; I tend to think, *I'll finish it tomorrow*. Then, tomorrow, something else comes up — something that I really need to do, or that I just want to do more than I want to finish that other job. However, I'm working on that and have had a few successes lately wherein I fought and won against 'I'll finish that tomorrow', and actually did finish.

The latest was the baseboards around our new-build little cottage. Now, for whatever reason, it's a legal requirement for code compliance to put boards around the foundations/piles to limit access under the house. There were two reasons ours didn't get finished earlier: we hadn't finished our storm-water system, and we had already gone over budget on the build. I wanted to save myself hundreds of dollars in labour for what wasn't that complex of a task, so I told the builder to leave the bit by the carport, as I would finish it myself. Well, I finally have. ▶

I installed more baseboards, using a few shorter lengths to take advantage of where the door was going

Final code compliance

The storm-water system was completed six months ago, so no more excuses about the plumber having good access. I really needed to address the outstanding final code of compliance inspection.

I wanted to be able to get under the house but wasn't sure what the best solution was, so I kept putting off the job while I figured it out. That really paid off in the end. It turned out to be easier than I had expected, it looks great, and even my wife was impressed.

I decided I needed two ways under the house: a large door under the deck, where the building is highest above ground level, to perhaps store bigger items, and a small panel to get to the in-line water filter to turn off the water if necessary.

All the boards in place, looking good

A decent door

First, the big door at the end. The initial consideration to take into account was that the door would likely be used a lot, so it needed to be solid and on decent hinges. This meant some support for the hinges, which I made by cutting an old post I had lying around into two lengths. I fastened these posts to the deck, hanging down vertically and over a shallow hole, lining them up with temporary boards at the bottom and midway up that continued off the baseboards already fitted.

I then poured concrete into the hole around and under the posts, and left them for a couple of days. The concrete would anchor the bottom and stop the post rotting. ▶

Another clever thought: I cut through the boards where the hinges were going, fitting the hinges before I cut the door out

We now have a door that is a perfect fit for the hole

That really paid off in the end. It turned out to be easier than I had expected, it looks great, and even my wife was impressed

Once the two halves were reattached, I used a belt sander to ensure that they closed easily, while allowing for some expansion and contraction of the wood; nothing wrecks doors and hinges more quickly than a sticky door that you have to force open or closed

The observant will notice the top hinges have moved. The doors didn't close evenly because the boards were slightly warped, but moving the hinges to the top of the doors fixed that. I added a small bolt to keep it closed, and it was finished

The opening is supposed to be that size; concrete will finish about an inch below the doors

My original idea was a single door, but I decided it would be too heavy and would put a lot of stress on the hinges, so I decided to split the door into two equal halves

My original idea was a single door, but I decided it would be too heavy and would put a lot of stress on the hinges, so I decided to split the door into two equal halves. Once it was cut out free, I added a third, wide strip down the inside, and glued and screwed it in place. I also took off the sides of the door and reattached them with glue, using the same screws and holes. I then cut the door in half, took the two halves back out, and reattached them to the hinges, which had been left in place — automatic alignment. ▶

The completed section of the baseboards, but no way to get to the water valve

First, I marked where the door was going to be on the already-fitted baseboards. The lines run down the inside of the two internal bits of framing. It's a good idea to screw on some temporary boards to hold the boards that you are going to cut through in place once you have cut them free

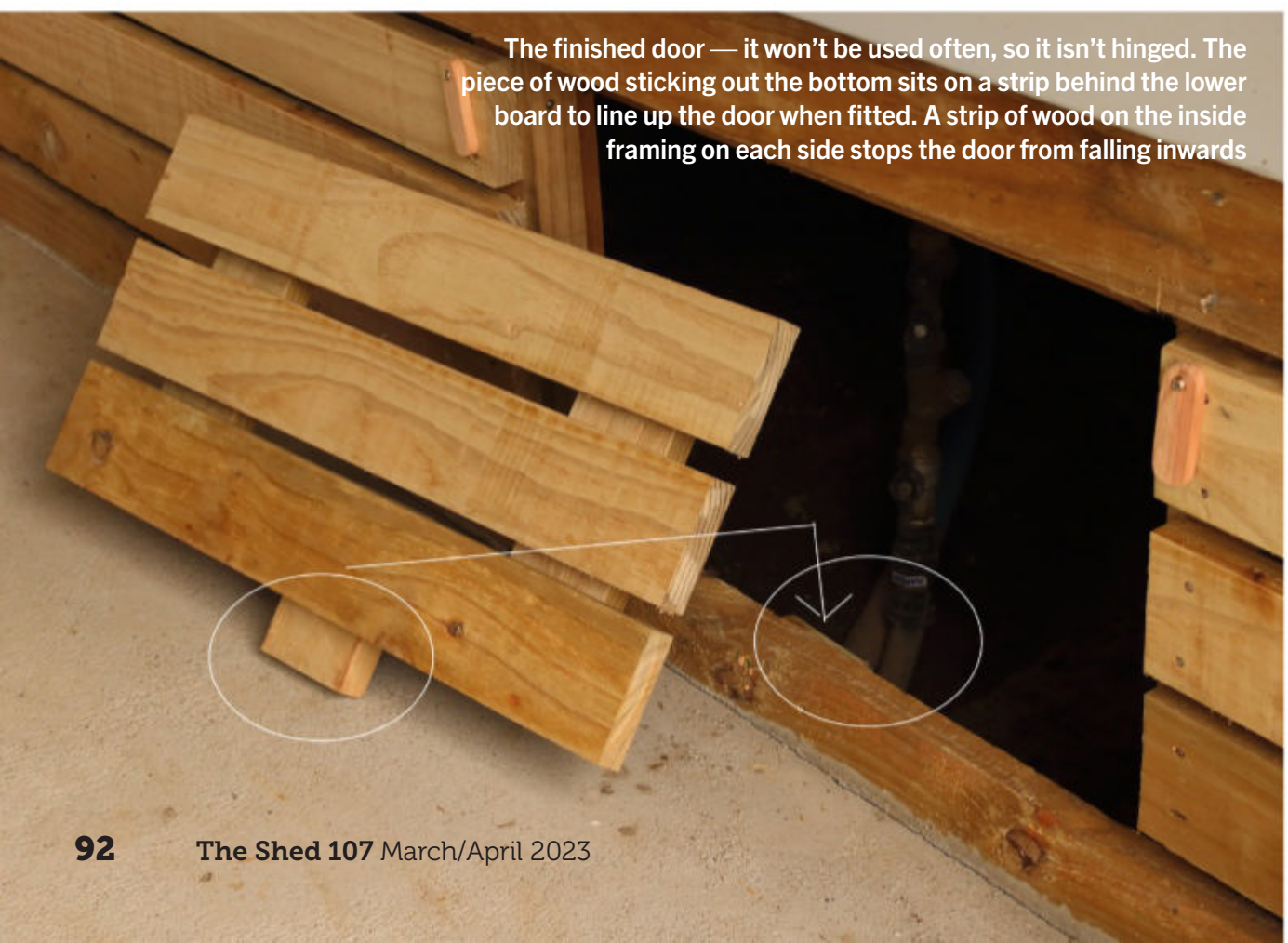
Small concealed door

The second access door was only to allow me to get to the water shut-off valve, so it didn't need to be very large; nor was I expecting to use it very much. I could have cut a hole then made a door to fit, but why not use the same idea again: cut the door out and use the pieces removed to make the door?

I took the cut-out section inside, turned it over, and glued and screwed two strips to the inside to make it a permanent small door. Once the glue dried, I could remove the temporary alignment boards from the front. I filled the holes with a mixture of glue and a little sawdust — no sign of them after I ran a belt sander over it a few hours later.

Job finished!

I'm getting really good with my little battery-powered circular saw. It's important to make sure that there are enough screws to stop the wood strips from moving in relation to each other



The finished door — it won't be used often, so it isn't hinged. The piece of wood sticking out the bottom sits on a strip behind the lower board to line up the door when fitted. A strip of wood on the inside framing on each side stops the door from falling inwards

Almost invisible; to open it, just turn the two little wood strips

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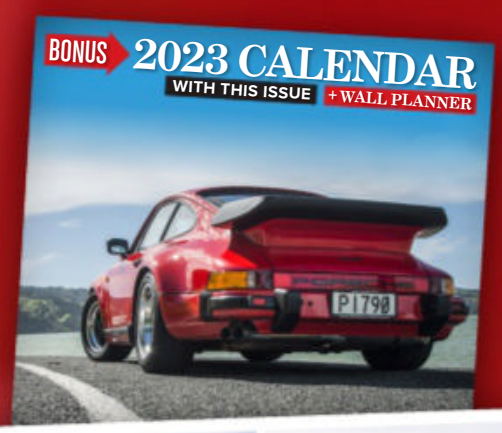
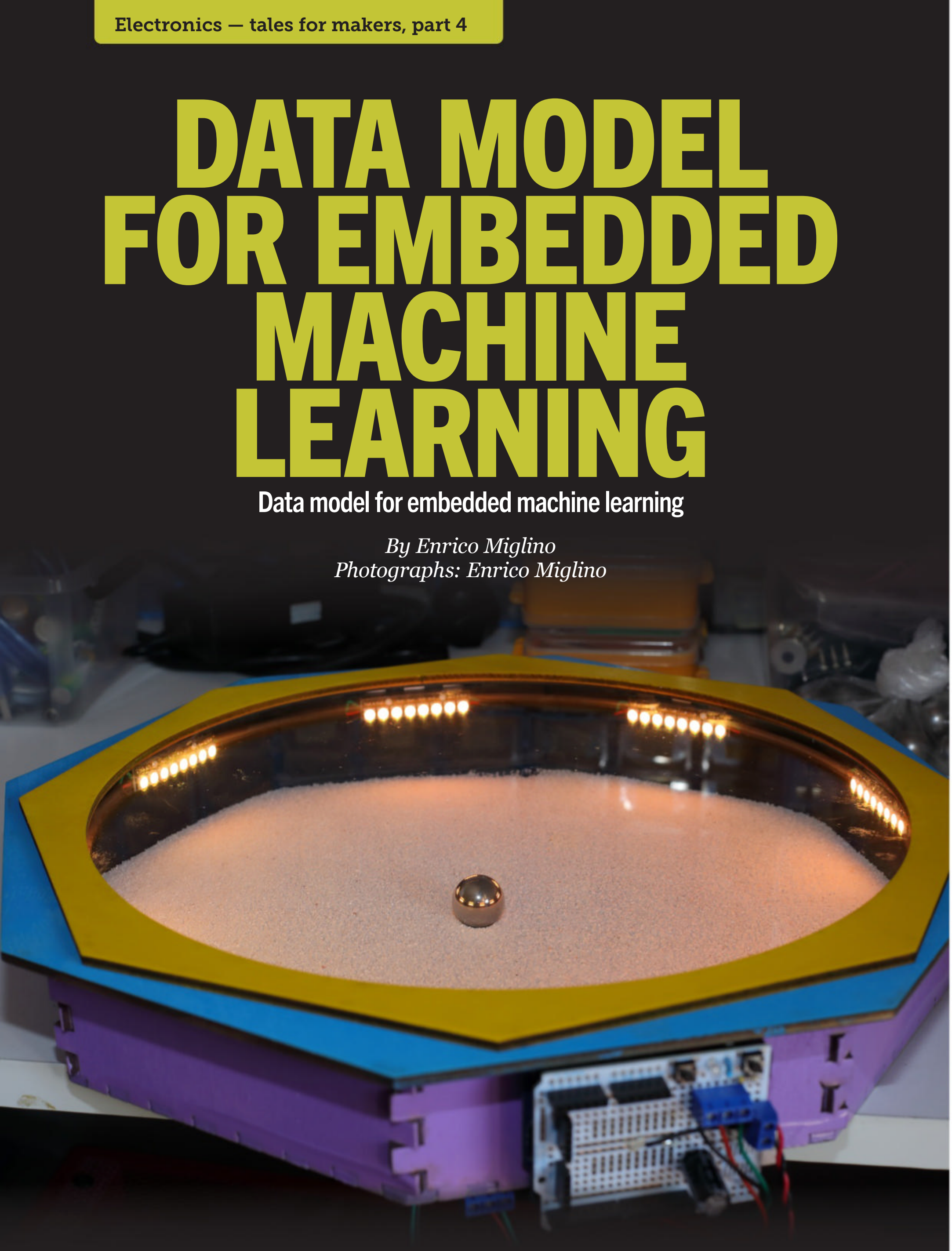


12 FULL PAGE PIN-UP CALENDAR

DATA MODEL FOR EMBEDDED MACHINE LEARNING

Data model for embedded machine learning

By Enrico Miglino
Photographs: Enrico Miglino



In *The Shed* Issue No. 105, we saw how machine learning (ML) could be embedded in a smart device such as the Arduino Nicla board. The following steps can be taken to activate the prediction features in our board:

1. Acquire data through sensors — usually part of the ML board creating a collection of samples.
2. Use the samples to define the data model with the ML platform — like Neuton.AI in our case.
3. Test the model with sample data on the platform using the Web.
4. Generate the software to embed the prediction features in the ML microcontroller.
5. Run the prediction offline on the programmed ML microcontroller.

This sounds very impressive, but a final problem arises: how to manage the microcontroller sensors to collect the initial dataset to create the model and send it to the Neuton.AI platform.

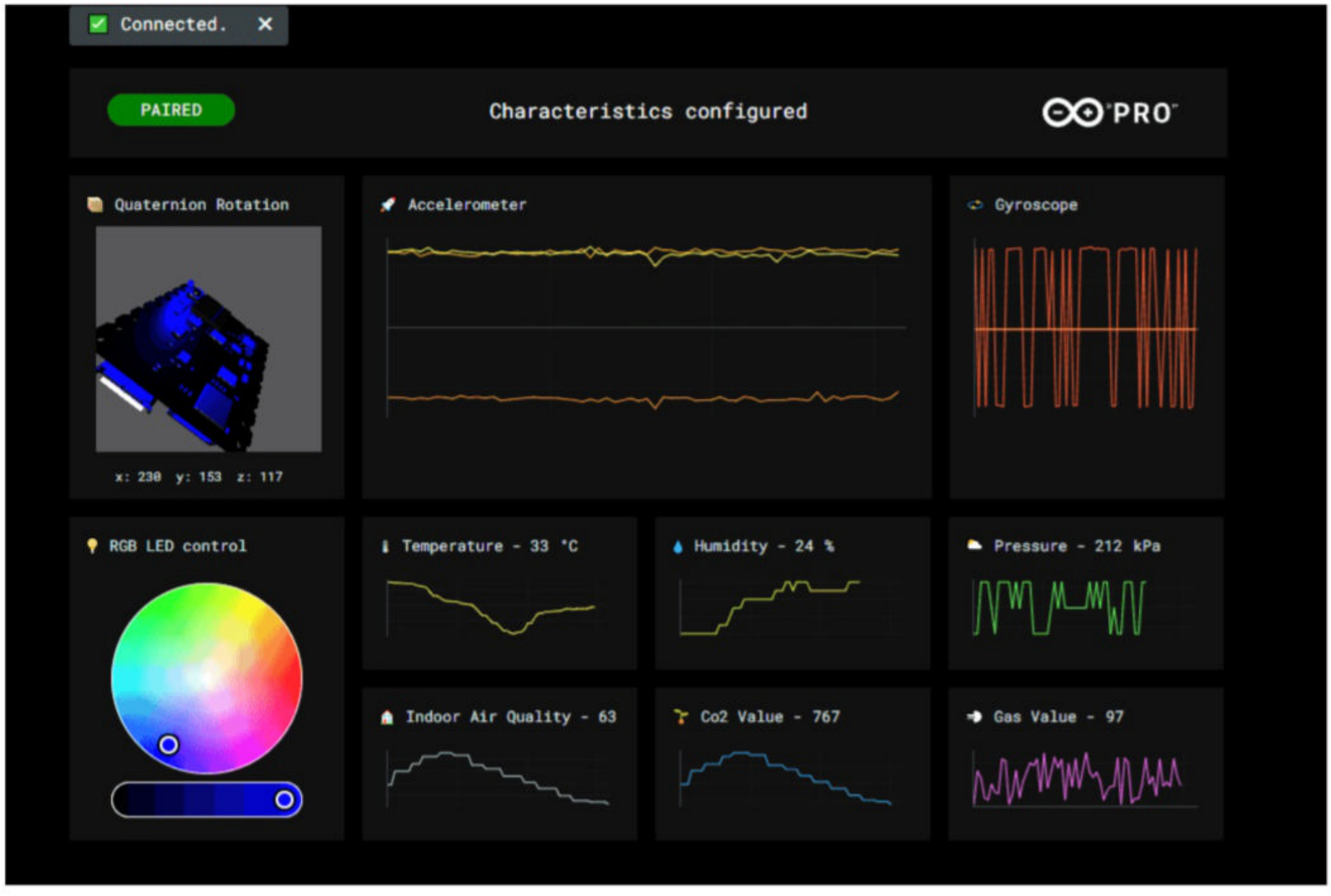
In this fourth part of Tales for Makers, I will use the real-world application that I have developed for this project to explain the method. The same approach matches a more generic methodology and can be applied in a wide range of cases.

Splitting the problem in two

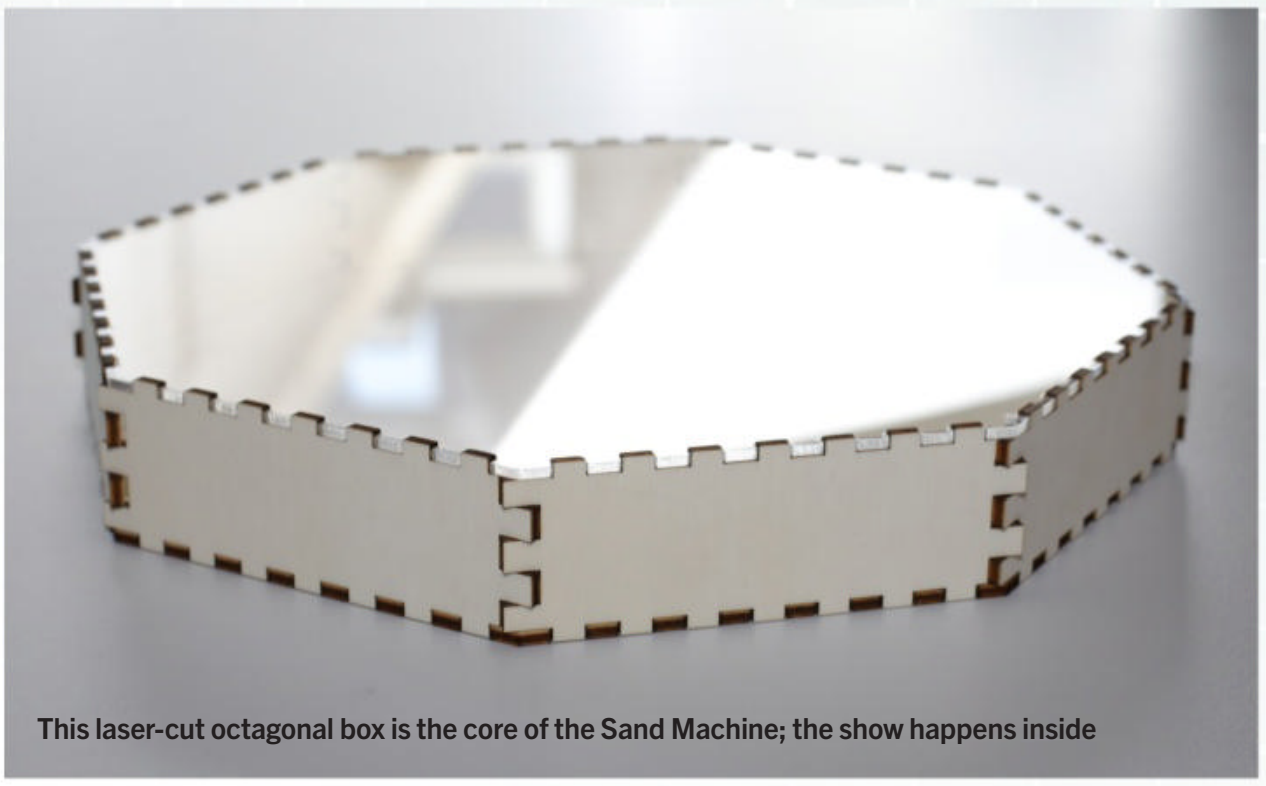
There are two distinct steps, requiring a different kind of software to put the microcontroller in the state of making predictions based on the values of the current sensors. The first is the preparation of the board to collect the data needed to create the model, and the second is programming the microcontroller, integrating the ML library.

In fact, the developer is not required to have the knowledge to make the predictions software library automatically created by the Neuton.AI platform — this feature is similar to many other ML frameworks. ▶

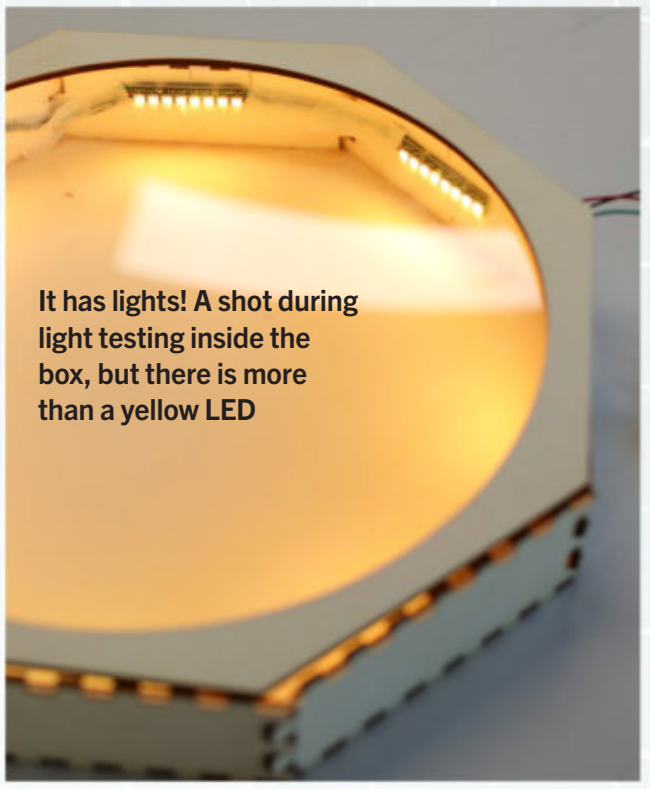
Google Chrome must be used, as this is the only browser nowadays able to run a server supporting a Bluetooth LE connection



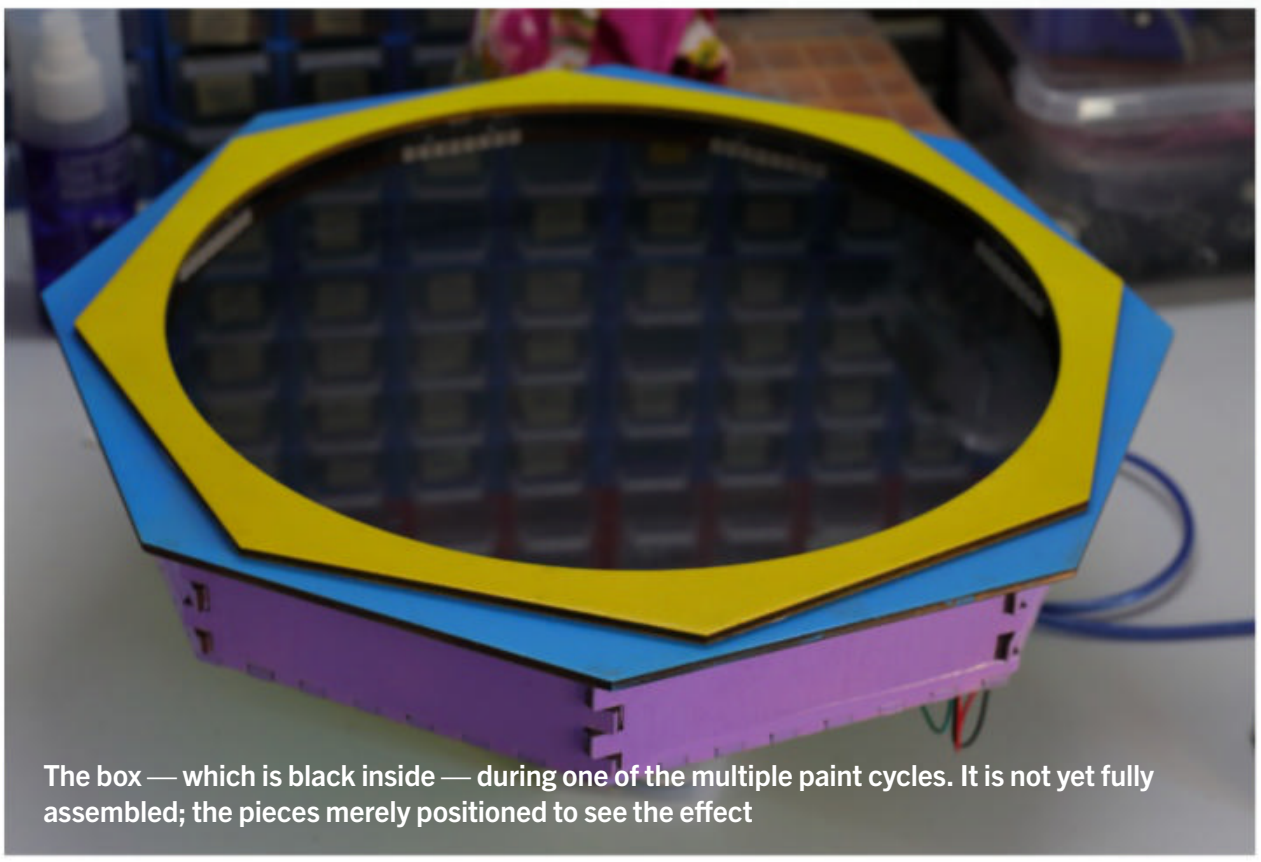
The Arduino Nicla dashboard shows in real time the state of all the sensors of the microcontroller connected through Bluetooth



This laser-cut octagonal box is the core of the Sand Machine; the show happens inside



It has lights! A shot during light testing inside the box, but there is more than a yellow LED



The box — which is black inside — during one of the multiple paint cycles. It is not yet fully assembled; the pieces merely positioned to see the effect

To make it appealing, and usable by developers, the Arduino Nicla board provides a complete, functional dashboard server

Custom application

The first part concerns a custom application to be developed almost entirely from scratch. This software is tailored to collect the data for the artificial intelligence (AI) platform (Neuton.AI in our case) that will create the provisional model.

The methodology I followed, described following, is specific to our case, but — as already mentioned — a similar process can be applied in many other scenarios. With the Arduino Nicla, I took advantage of the availability of the Bluetooth Low Energy (LE) connection, with which I created a communication client–server with a local computer running the acquisition system on the browser.

Note: the model datasets have been created to collect environmental data such as temperature, air pressure, and air quality. Thanks to the Bluetooth connection, it has been possible to work without connecting the sensor directly to the computer. However, this method has an important limitation: Google Chrome must be used, as this is the only browser nowadays able to run a server supporting a Bluetooth LE connection in addition to the traditional networking methodology.

Programming the Bluetooth client

The Arduino Nicla board acts as a client with a simple task: continuously sending sensor data to the computer connected via Bluetooth LE. On the other side, the Google Chrome web browser should be able to receive the data and process it as needed.

The creation of this client–server model is reasonably complex, involving several communication technologies: Bluetooth LE, with the creation of custom characteristics; implementation of a Bluetooth server on the browser able to receive the data; creation of a local http page running the server; and more.

In addition to the difficulty of developing both components, another aspect requires specific knowledge provided by the microcontroller producer: the unique user ID (UUID), including some hardware details on how the Bluetooth transmission manages them.

To make it appealing, and usable by developers, the Arduino Nicla board provides a complete, functional dashboard server running on any local Google Chrome browser, together with the Bluetooth implementation of the sensors. ▶

A test of the lighting system after full assembly

```
#include “Nicla_System.h”

#include “Arduino_BHY2.h”

#include <ArduinoBLE.h>


#define BLE_SENSE_UUID(val) (“19b10000” val “-537e-4f6c-d104768a1214”)


const int VERSION = 0x00000000;

BLEService service(BLE_SENSE_UUID(“0000”));
```

The software above — the first lines of the Nicla source code of the Bluetooth implementation — shows the constants defining the Bluetooth LE identification on the microcontroller.

Note: to make the software work on the Arduino IDE, the two dedicated libraries, Nicla_System and Arduino_BHY2, should be installed before the sources are compiled.

```
BLECharacteristic accelerometerCharacteristic(BLE_SENSE_UUID(“5001”), BLERead | BLENotify, 3 * sizeof(float));


BLECharacteristic gyroscopeCharacteristic(BLE_SENSE_UUID(“6001”), BLERead | BLENotify, 3 * sizeof(int16_t));


BLECharacteristic quaternionCharacteristic(BLE_SENSE_UUID(“7001”), BLERead | BLENotify, 4 * sizeof(float));
```

The three examples above show how every sensor is associated with a custom characteristic of the Bluetooth LE; all the sensors are defined similarly on top of the program.

```
 void onTemperatureCharacteristicRead(BLEDevice central, BLECharacteristic characteristic){
   float temperatureValue = temperature.value();
   temperatureCharacteristic.writeValue(temperatureValue);
 }
 void onHumidityCharacteristicRead(BLEDevice central, BLECharacteristic characteristic){
   uint8_t humidityValue = humidity.value();
   humidityCharacteristic.writeValue(humidityValue);
 }
 void onPressureCharacteristicRead(BLEDevice central, BLECharacteristic characteristic){
   float pressureValue = pressure.value();
   pressureCharacteristic.writeValue(pressureValue);
 }
```

White calibrated sand (0.1 mm) test, with the desired contrast

Positioned no more than 10m from the server's computer

As shown on page 97, every characteristic associated with a sensor — the example shows the functions for temperature, humidity, and pressure — corresponds to a function processing the sensor and sending it to the server (the writeValue function).

The setup() — called on boot — waits for the Bluetooth connection to the server, then initialises the characteristics, while the loop() function cyclically sends the last updated values.

After uploading the compiled program to the Arduino Nicla, the microcontroller can be powered and positioned no more than 10m from the server's computer.

The server dashboard

To make the server for data collection, I have started modifying the original Arduino Nicla dashboard. It uses the already-mentioned Bluetooth component and runs only on the Google Chrome browser; some complex parts require many development days without a previous reference. The full dashboard server and Nicla sources, as provided by arduino.cc, are available at:

create.arduino.cc/editor/FT-CONTENT/333e2e07-ecc4-414c-bf08-005b611ddd75/preview

arduino.github.io/ArduinoAI/NiclaSenseME-dashboard/

The project, with the sources I customised to save the environmental information data in CSV (comma separated value) format for sending to the Neuton platform, is available under an Open Source licence on GitHub: github.com/alicemirror/drone-patrol. The dataset I produced for the Drone Patrol experiment, together with the sources to control the Tello drone in Python via a scripting file, is available on the same GitHub repository.

The next adventure

In the next issue of *The Shed*, we will meet Ray again, facing a new and challenging adventure about which I won't reveal anything yet. Instead, I want to introduce the next project, which has been inspired by this issue's adventure: the Sand Machine.

It is a relatively simple project with a high scenic impact. Of course, there is some software complexity, and some mechanical aspects will take many days, tries, and tests to reach a good result — but makers are never scared by these difficulties.

Art and maths

Mathematics is not only numbers and computation; it is much more. For some projects, it can also be closely related to art. One of the most ancient expressions of art and spirituality, strictly connected to maths, is the graphical representation of mandalas.

According to Wikipedia, "A mandala is a geometric configuration of symbols … [M]andalas may be employed for focusing the attention of practitioners and adepts, as a spiritual guidance tool, for establishing a sacred space and as an aid to meditation and trance induction … [I]n Hinduism, Buddhism, Jainism and Shinto it is used as a map representing deities, or especially in the case of Shinto, paradises, kami or actual shrines." ▶

The dataset I produced for the Drone Patrol experiment, together with the sources to control the Tello drone in Python via a scripting file, is available on the same GitHub repository

The 'pen' of the Sand Machine: a 2cm diameter iron sphere

The inside of the Sand Machine. Did I miss something?

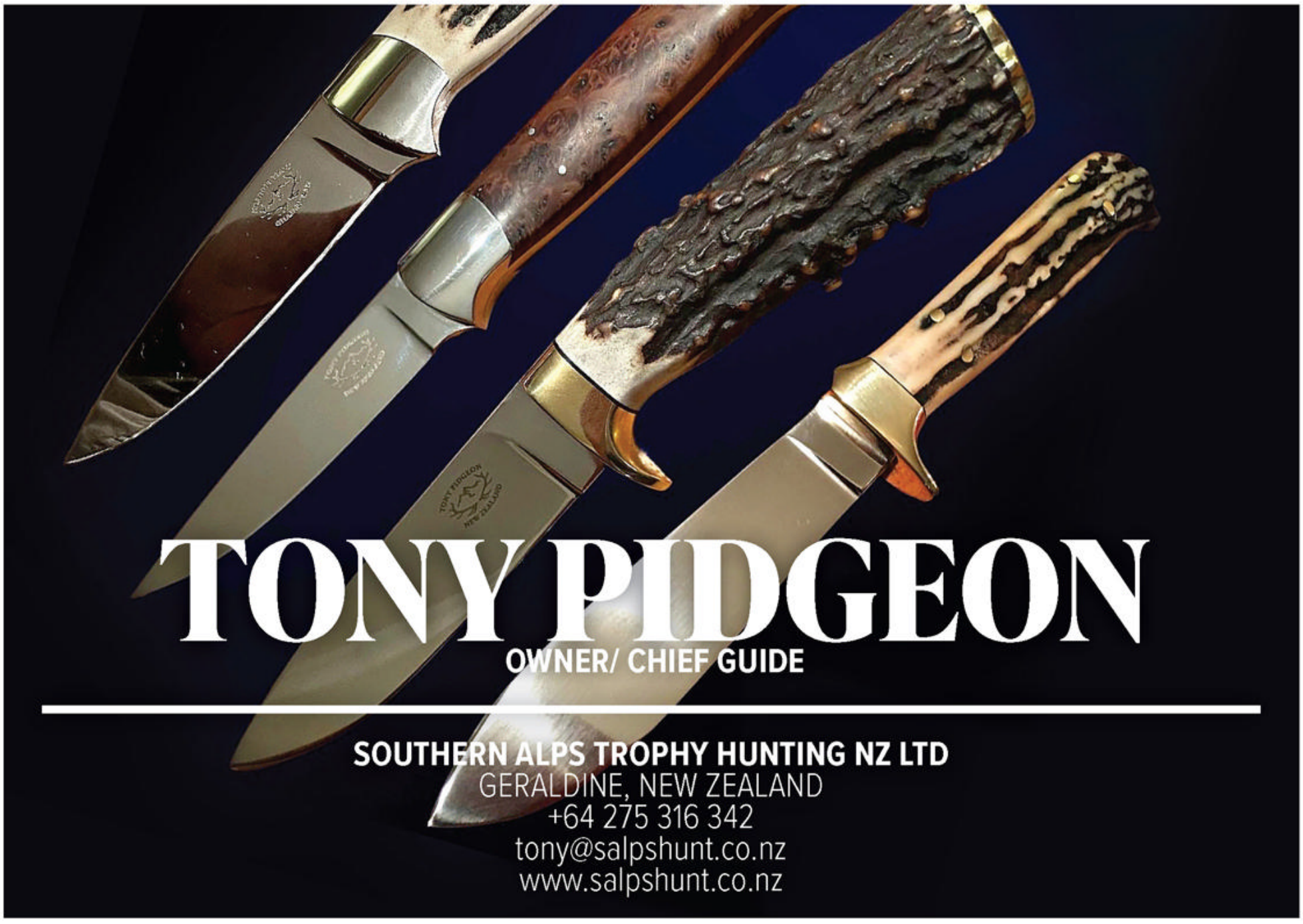
The basic idea of the Sand Machine is to create mandala designs; of course, there are notable differences from the traditional graphical mandala designs we are used to. The generated figures are derived from circular trigonometric functions — for example, the Archimedes spiral, where some parameters are randomly altered to produce an original design every time the process is called.

Then, there is another difference from the traditional graphical representation, maybe painted, printed, or plotted by a computer: the Sand Machine, as its name suggests, draws on the sand.

Maybe it is not a completely original idea, but a machine that automatically generates infinite figures on the sand exclusively based on mathematical functions is undoubtedly fascinating.

In the next episode of Tales for Makers, we will see the building process and what Ray has to do with my Sand Machine.

A machine that automatically generates infinite figures on the sand exclusively based on mathematical functions is undoubtedly fascinating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SIMPLE PLEASURES

Not all sheddie projects have to involve complexity and a vast array of tools; modest undertakings can be equally satisfying

By Coen Smit
Photographs: Coen Smit

A pretty one-off tile framed for display

A plea to the editor from Deigh Davies back in Issue No. 101 of *The Shed* struck a chord with me. Often, I undertake small projects and, because of their size and simplicity, I tend to dismiss them as potential articles for this great magazine. To rectify that, I have put together this article covering some of these smallish, shed excursions.

As you may know from some of my previous articles, I'm an inveterate scrounger of bits and pieces that I can cobble together to make something I need. Recently, it turned out that I could do with a small trolley that needed to carry a short broom, a hand-held vacuum cleaner, and a bucket to clean and collect cat litter in the cattery that my wife and I run. As luck would have it, we were about to throw out an old shopping trolley that was perfect for the job. I secured a frying pan, minus handle, to the base to support the bucket, and a length of PVC pipe on one upright to hold the broom. I used a larger piece of PVC on the other upright to accommodate the vacuum cleaner. Total build time: around 45 minutes once the bits and pieces were gathered together.

Problem solved. I now have one hand free to carry the clean-litter dispenser and drag the 'clean-up crew' behind me on my rounds. Of course, this is a bit of kit for a specific job, but undoubtedly you are faced with situations where you are lugging specific tools around regularly and it would be useful to consolidate them.

Brownie points

We're all aware as sheddies that making small presents for our nearest and dearest is a good way to accumulate Brownie points, as well as occupy our time gainfully. One such project involved doing the rounds of some tip shops and collecting interesting LP record covers. Many of them depict appealing artwork or good-quality photos of the '60s and '70s — a time when we were in our prime.

I know that for some what I'm about to admit to will be sacrilege! When I find an interesting album cover, I make a simple picture frame for it, using a nice piece of timber such as merbau, Tasmanian oak, or the like; a thin sheet of MDF; and another of Perspex.

The cost is minimal and the process straightforward. Using a table saw or a circular saw and a guide with a steady hand, cut two grooves 3–4mm deep down the length of the timber, sufficiently long to form the four sides of the frame. One groove will hold the Perspex while the second holds a same-size sheet of thin MDF as a backing board. ▶

I'm an inveterate scrounger of bits and pieces that I can cobble together to make something I need

The cobbled-together cat litter cleaning trolley

Most saws will cut a groove around 3mm wide, which suits the Perspex and MDF. If it's too tight a fit, sanding the grooves will normally eliminate the problem. Be careful when sanding the Perspex edges that you don't scratch the surface. I suggest using Perspex rather than glass because it's more forgiving during cutting and assembly and, in my opinion, gives as good a result.

Assembly

Once each piece is cut to the required 45-degree angle in a mitre box or on the cut-off saw, the frame can be assembled. Glue three sides, making sure the frame is square. The record cover can now be dropped in between the Perspex and the MDF. Glue in the final side.

Hints

There are a few things to watch out for.

The Perspex and the MDF will need to be cut 6–8mm larger than the inside distances of the frame sides to allow for the groove depths.

Once the timber is sanded, dry assemble the sides and check the length of the diagonals to make sure that you will be able to get the picture frame square and it is the right size. This is important, as you don't want the record cover to be able to go askew in the frame. One way to ensure this is to cut a second pass on one groove slightly wider to accommodate the cover and the MDF, but you will lose a small margin of the record cover this way.

The difference between a good and a bad picture frame is the accuracy of the 45-degree corners, so it pays to spend time making sure they are as accurate as you can get them.

Assemble the finished frame before the glue completely sets on the three sides, and check the diagonals again with it lying on a flat surface. This will allow you to fractionally persuade it into the correct final position.

Framed record covers with cat silhouettes in attendance

Simple hand tools are usually sufficient to accomplish the construction tasks involved

Options

It's not only record covers that lend themselves to this treatment. I've used it to make interesting wall hangings of tiles, plates, calendar pictures, fossils, and family memorabilia that would otherwise be forgotten and collect dust in a drawer or the attic. It is also a nice way of making something that is more than a flat, mainly two-dimensional picture. Using timber around 30-plus-millimetres wide creates a kind of miniature cabinet for what is housed inside and makes it more eye-catching.

If you have access to a jigsaw, there is a wealth of small projects that you can embark on with some timber offcuts. For instance, silhouettes of cats that hang off, or sit atop, a picture frame or window, or that sit in the garden, can be cut out and will liven up any scene. If drawing up a suitable animal shape is not in your repertoire, then google what you are looking for and you will have any number of examples to work with.

For a small cost, your local stationer or print shop will enlarge the picture to the size you want. Lightly glue it to your timber and start cutting. Finish with a small file and sandpaper before painting.

Useful boxes

I confess that I also like making boxes, both small and large. A nicely made box becomes a feature in any room and works like a stationary vacuum cleaner, accumulating all the odds and ends that would otherwise clutter up the room. Even a small box guards jewellery, watches, receipts, small change, etc. Not a lot of materials are needed, and simple hand tools are usually sufficient to accomplish the construction tasks involved.

The box can be embellished and built to a style to suit your taste. I like rugged-looking boxes reminiscent of the seafaring age, as well as those that hint at the more architectural look of the art-deco era. I also enjoy the interaction of timber and metal in a single piece to add highlights that set it apart from more utilitarian examples.

Care is needed here too

Making a small box requires as much care and attention as making a picture frame. The corners must be precise, and opposing sides must be exactly equal in length and width to produce a neat job. One tip that has proven successful in the past is to construct the box and lid as one piece and then cut the lid off. That way, the lid and sides of the box can be perfectly aligned.

The intricacy and detail of the finished box is really determined by the tools you have available. Access to a cut-off saw and a table saw simplify and speed up the construction, as does having a small router, clamps, etc. However, many beautiful specimens have been built with handsaws, wood chisels, and sandpaper, so don't be put off if you do not have access to anything else. ▶

Block for gumboot extractor showing placement of angle iron

Boots and all

Living on a five-acre block in Tasmania, the need to don gumboots is ever present, especially in winter. Unfortunately, with advancing age the flexibility and dexterity that I once possessed have declined somewhat. My enthusiasm for struggling to get my gumboots off has similarly declined, hence my next small project. I must confess that the gumboot-remover I have knocked together makes no pretence at either prettiness or high craftsmanship. It's made to do the job, and lies unloved and neglected until called on to do its duty.

I utilised a piece of scrap shelving as the base, with some offcuts of radiata pine and a couple of pieces of 25mm angle iron. As you can see from the accompanying photographs, the only tricky part of the job was to set both bits of angle iron in an expanded V-pattern and slightly back from horizontal at the narrow end of the V.

Positioning foot and gumboot

It works perfectly and has made the prospect of having to wear gumboots much more appealing than before

Easy to use

You use the gumboot-remover by placing one foot on the baseboard and lifting the other in the wider end of the V then drawing the foot back until the device grips the boot. At that point, you lift your foot upwards to draw it out of the gumboot. Before removing your foot altogether, nudge the boot forward to release it from the V. I set the width of the V by inserting my empty boot in it until it looked as if it would lock on the small ridges of the boot. It works perfectly and has made the prospect of having to wear gumboots much more appealing than before.

I'm sure that if you don't have a couple of pieces of angle iron available, a couple of strips of hardwood would also work, as would a single V-shape cut from a piece of timber. I simply went for angle iron because I had it lying around. The support frame allows you to use it anywhere, but if you have a wall handy that will do just as well.

Get cracking

These are some of the small projects I have completed that require just a handful of tools. They aren't the sort of endeavours I would regard as suitable for an article in *The Shed* per se. However, I take to heart that not everyone wants to embark on large-scale, complex projects, and just as much satisfaction can be gained from pottering around cobbling together things that make life a bit easier or just more interesting.

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QUEEN OF THE RIVER

The romance of travelling the Whanganui River by paddle steamer lives again, thanks to the labour of enthusiasts — and their work continues

By Jason Burgess
Photographs: Jason Burgess

(Photo: Courtesy of the Riverboat Centre)

A hundred years since she was first launched, and almost 50 since she sank into a muddy grave, *Waimarie* once again graces the Whanganui. The glory days of river travel, when more than a dozen steam and motor vessels plied the inland waterway, are long gone. But an excursion on the lovingly restored side-wheel paddle steamer — the only vessel of its type in the country — gives day trippers a taste of times past

As far as living history goes, Whanganui's paddle steamer *Waimarie* is as good as it gets. It is the pride of the city, the last of its kind in New Zealand, and has been a fixture on the Whanganui River for more than 100 years.

When launched in 1900, *Waimarie* was the first registered boat in the country for the new century. In its first year of operation, it carried more than 25,000 passengers up to Pipiriki and back.

Today, *Waimarie* is as active as ever, introducing sightseers and private parties to the pace of life — and technology — of yesteryear, when our waterways were the highways and the Whanganui River was considered the 'Rhine of the South Pacific'.

Inspecting a steam engine cylinder bore (end cover removed)

Peaceful waters

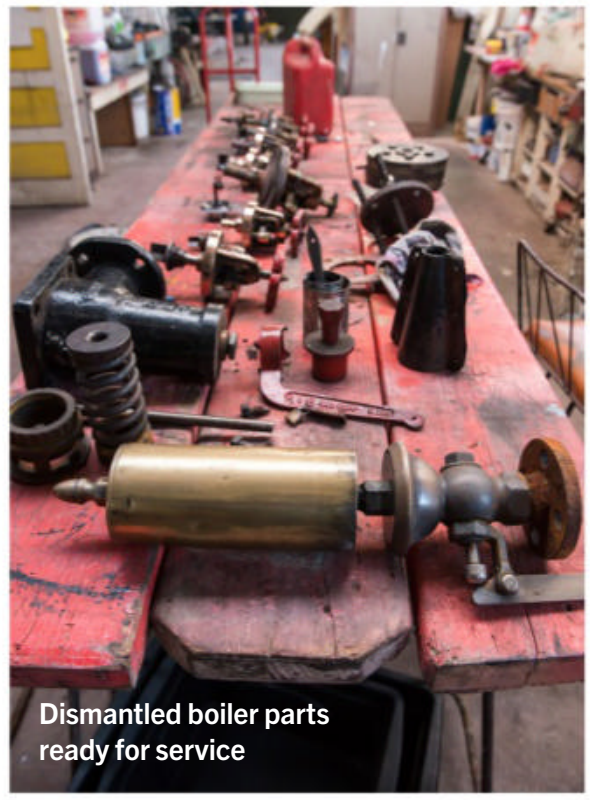
The word 'waimarie' means good fortune or peaceful waters, yet fate has not always been so kind to this grand old steamer. Woefully, it spent four unloved decades lodged in a muddy riverbank, weathering floods, log hazards, and souvenir collectors. The steamer's salvage and restoration in the 1990s became a millennium project that brought the town together, with locals donating time, money, skills, and the return of many of the boat's original artefacts.

Waimarie's original engines were rebuilt, and its boiler was replicated to original specs; the hull and decks were restored as best as expertise allowed. After seven years and more than 67,000 hours of volunteer labour, *Waimarie* was relaunched as the nation's first registered vessel for the new millennium. ▶

After seven years and more than 67,000 hours of volunteer labour, *Waimarie* was relaunched as the nation's first registered vessel for the new millennium

Engineer John Tate at the gates to the *Waimarie*'s pier

John in ‘his office’ — the *Waimarie*’s engine room



Dismantled boiler parts ready for service

Keeping this vessel ship-shape for future generations is a work in progress. It takes a dedicated crew of eight full-time workers and six volunteers to tend to its well-being and operations. When the boat rests during the winter months, the maintenance team gets busy in the Victorian-era workshop, which is housed, adjacent to the Riverboat Centre and Riverboat Museum, in the original Wanganui Rowing Club building (1888).

Annual extensive survey

Engineer John Tate might call the engine room his office, but during the off-season, when the boiler is stripped down for its annual survey, much of the engineer’s time is spent on shore, servicing and checking off individual parts in readiness for inspection.

Valve bodies are examined for cracking; seals are replaced. Valve seats are ground and tested to see that they sit properly. The condition of stem threads is vetted; the stems themselves assessed to ensure that they are not bent. Only then will they make the grade for the inspection. ▶

When the boat rests during the winter months, the maintenance team gets busy in the Victorian-era workshop

Oil-pump components from the generator steam engine

> “In other words, a good fire pops the safety valve. If the pressure keeps increasing, you fail”

Overhauling steam valves from the boiler

Once all that work has been signed off and the boiler reassembled, the inspector is called back for an on-board steam test.

“The boiler is fired up,” says John, “and the safety valve is checked to see (a) if it is operating at the correct pressure, and (b) it doesn’t accumulate. In other words, a good fire pops the safety valve. If the pressure keeps increasing, you fail. The original pressure gauge is 120 years old. It was recovered from the boat when she was laid up, and returned when she was restored. It is still accurate; it is checked every year against the certifier’s gauge.”

A life on the water

John says he’s been around boats most of his life. At one time, his father owned a 45-foot trawler and a large yacht. As a boy, he remembers sailing on the river to where the *Waimarie* lay.

“Initially, all her upper works were showing above the waterline. ▶

Steam valve bonnet after polishing

Firewood cut and stacked ready for the next sailing

Sailing days in the engine room

"The first job is to check if there is water in the boiler; open up the gauge glasses and never light the fire if you don't have sufficient water. If there isn't enough, then obviously it is leaking.

"Next, clean out the firebox and begin lubricating, before lighting it up. An even fire bed of coal across the eight-foot-deep grate is essential for maintaining pressure. If the bed is too thick, you won't get enough air through and you won't get enough heat. If it's too thin, you'll get too much air through and cold air, and no heat. It has to be even; it's all technique.

"The stoker looks after the fire and the water pressure. Water circulates through the tubes — 306 tubes on each side — and the fire goes around the outside of them. Gauge glasses — always two — show the water levels in the boiler.

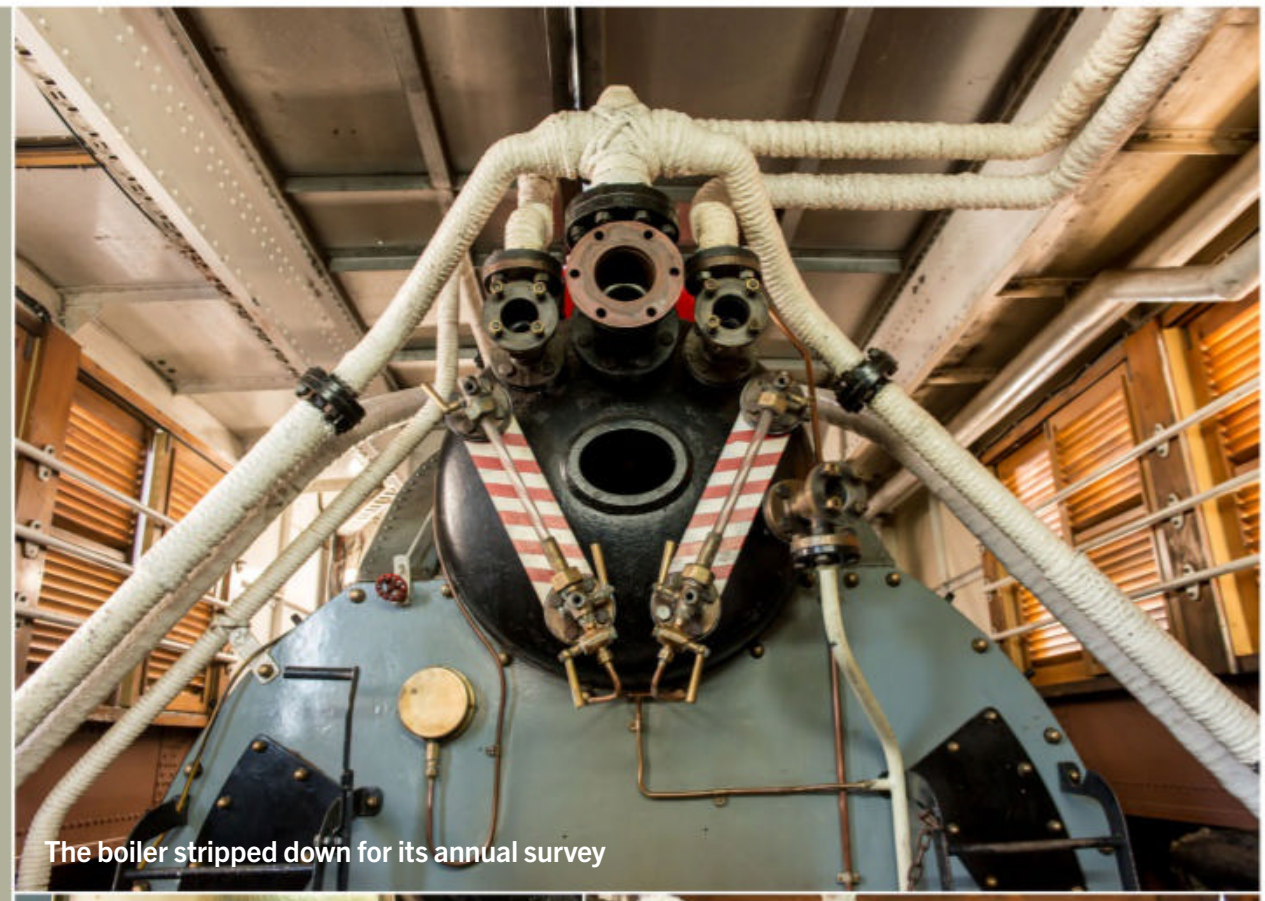
"Before we sail, we test run the engines to warm them up. Steam engines don't like to be cold; steam with cold steel or cast iron turns back to water, which doesn't work your engine very well.

"While *Waimarie* is running, the engineer looks after the engine, making sure it's not getting hot and that everything is lubricated. He drives the engine to the skipper's instruction. Everything is hand lubricated, so it's oiled before we sail, but a couple of the points won't last for two hours so they have to be re-lubricated, and you have to get down to check that the bearings are not running hot.

"Back in the day, the big issue was shallow water. The *Waimarie* would travel 60 miles to Pipiriki, and, in that distance, there are 40 rapids to get up. The speed needed to get up the rapids was never a problem but the water level was. She has a shallow draught: 600mm. Wire ropes were anchored at the head of the rapids, so that if they ever got in trouble they could attach the ropes to the steam winch on the bow and haul themselves up.

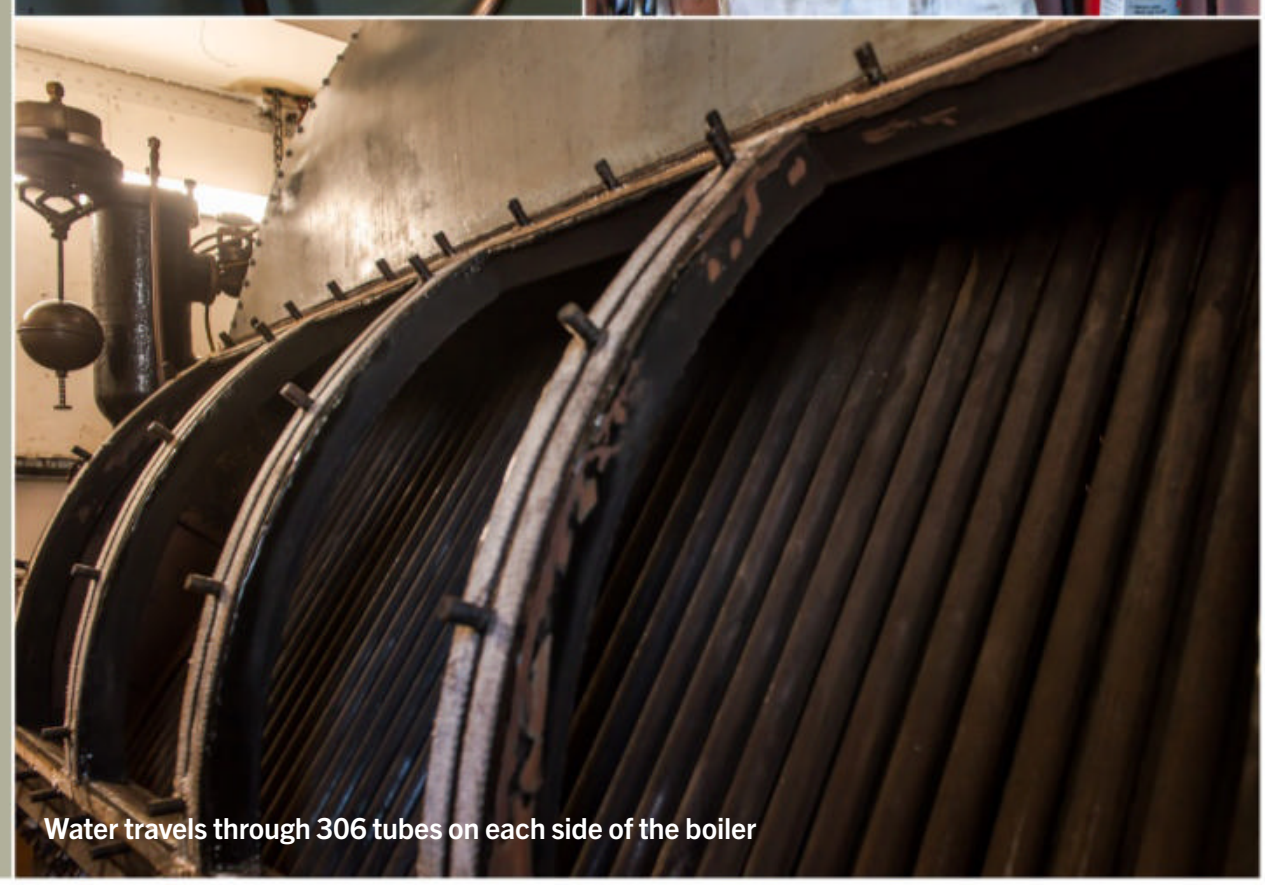
"Coming down the rapids must have been interesting.

"Virtually every vessel built at the time had a telegraph system [for] the control of the engines in the engine room. A handle moved on the bridge would move the pointer in the engine room to direct the engineer. The engineer responded by turning his handle to acknowledge. We don't have an engine room telegraph because the hatches are usually open and the skipper is visible. He uses hand signals or he yells — you can usually tell the urgency by the panic in his voice!"



The boiler stripped down for its annual survey

The original 120-year-old pressure gauge



Water travels through 306 tubes on each side of the boiler

Injector (Penberthy pattern) before polishing

They were considered a hazard to navigation, so virtually anything above the deck, including a paddle wheel, was eventually cut off," he says. "There was a sign nearby that read, 'Danger, sunken wrecks'. Someone had changed it to 'Danger, Drunken Wrecks'."

John reckons, "The combination of working on boats and with steam is a wonderful world. With steam, you can see it operating. It is old, rare, and the knowledge is disappearing, so a part of my interest is in relearning. It is quiet too; we don't have to wear ear muffs." ▶

> "It is old, rare, and the knowledge is disappearing, so a part of my interest is in relearning"

History

In the late 1800s, the Whanganui River was a vital link in the overland route between Auckland and Wellington. Southbound passengers would travel by rail and coach initially to Pipiriki and later to Taumarunui, where they boarded a riverboat downstream.

The name of entrepreneur Alexander Hatrick is synonymous with the fortunes of the Whanganui River. Hatrick not only recognised the potential of establishing inland trading routes via the river but he also understood the prospect of exploiting the scenic beauty of the area to international travellers. Under Hatrick's watch, the river was redubbed 'The Rhine of Maoriland'. At the peak of his river operations in the early 1900s, A. Hatrick & Co. ran a 12-strong fleet of riverboats, servicing the river communities and transporting tourists.

As well as operating a large hotel at Pipiriki, Hatrick's also ran a fully equipped houseboat with accommodation for 36 guests. The boat was built in Taumarunui and floated down to the mouth of the Ōhura River.

The *Waimarie* was designed and built in 1899 by Yarrow & Co. Shipbuilders in London and transported in kitset form to Whanganui. She had the broadest beam of all Hatrick's work boats so, as well as ferrying passengers on scenic excursions, she carried everything from livestock and wool to mail and supplies to and from upriver settlements. When the road went through to Pipiriki in the 1930s, it killed off much of the river trade. *Waimarie* continued operating sporadically until 1952, when an incident left her listing badly. Her hull filled with silt before she could be rescued, and there she sat for the next 40 years.

Waimarie on the river in her heyday

In 1993, the *Waimarie* was extracted from her watery resting place

Salvaged from the mud by the Whanganui Riverboat Restoration and Navigation Trust, *Waimarie* was rebuilt in a derelict boathouse, using original design and manufacturing methods.

John holding original piston rings

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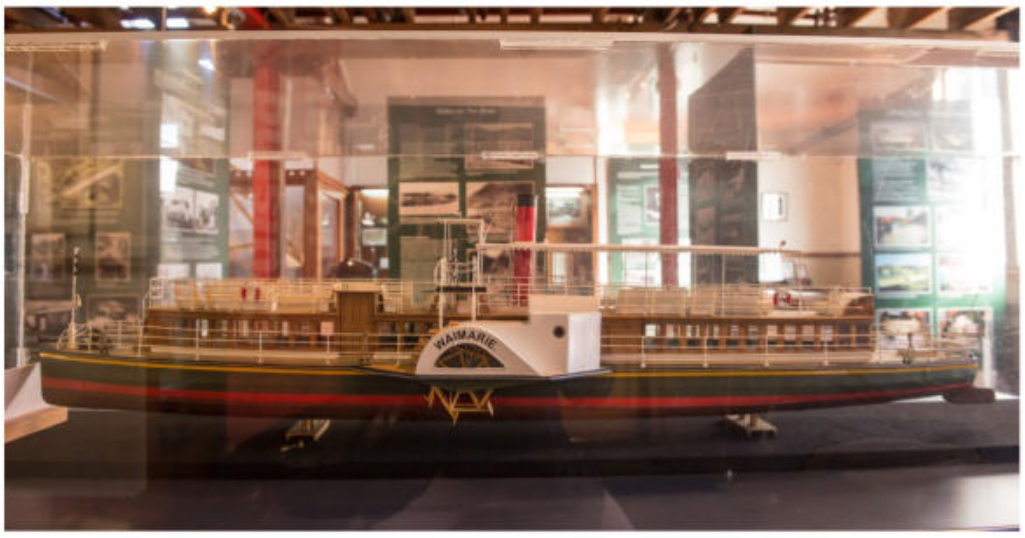
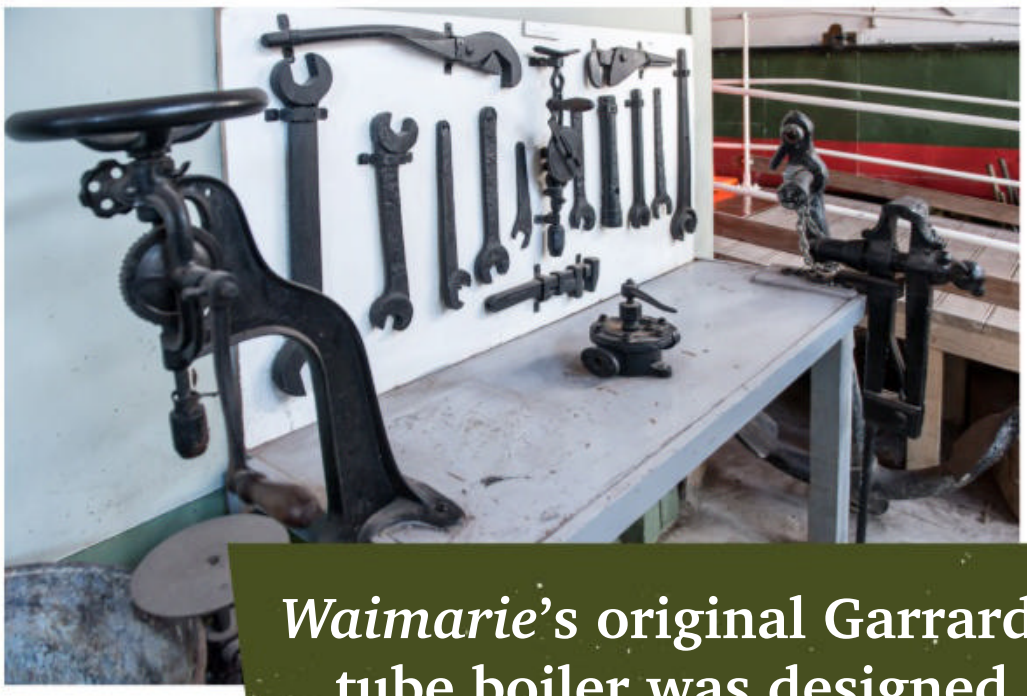
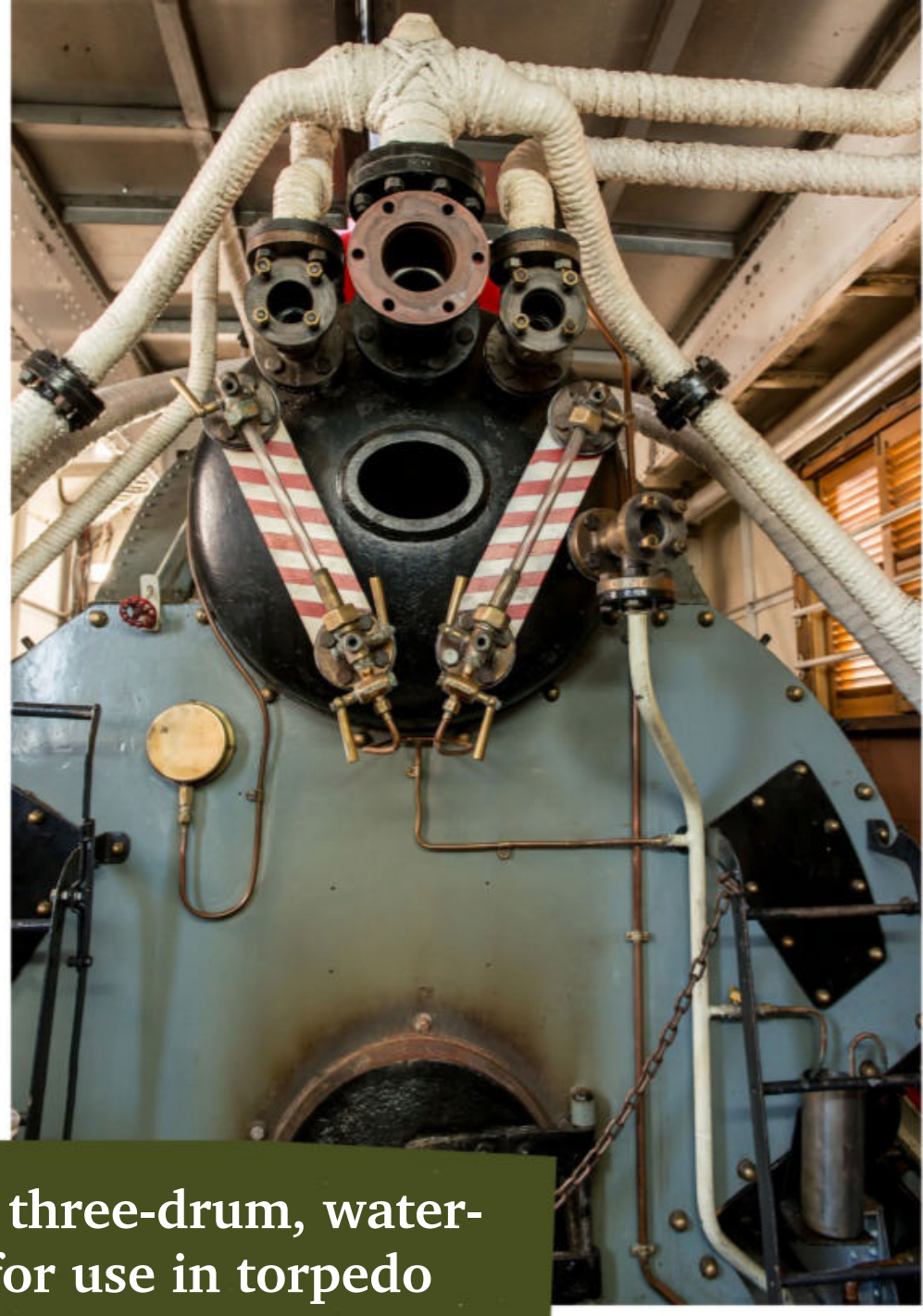






Waimarie's original Garrard three-drum, water-tube boiler was designed for use in torpedo boats and was state of the art in its day

Spare parts in the shed

Throttle valve handle

In a former role, John spent time on the steam tug *Lyttelton*, which had an old Scotch marine boiler that held around 30 tons of water.

He says, "The main advantage of *Waimarie*'s boiler is that it is very light; it only holds about 1100 litres of water — about one ton. We can go from dead cold up to working pressure within an hour because that is what it was built to do. By comparison, if we were going to sail the *Lyttelton* on Saturday, we would start her up on Thursday afternoon to raise steam!"

Remarkable Kiwi boilermaking

Waimarie's original Garrard three-drum, water-tube boiler was designed for use in torpedo boats and was state of the art in its day.

"Eaststeel in Dannevirke did a remarkable job of replicating it. [There were] no drawings, just the remains of the original and historic photos of any other boilers that they could reference from. Our working pressure is 150 pounds per square inch but we're exhausting it against the atmosphere, so take 15 pounds off that and that is ▶

Bilge pump set-up: steam pump above, hand pump below

Bilge pump suction manifold, which can pump from any compartment on the boat


Gauge glass cover


The Wanganui Rowing Club building, now home to the Riverboat Centre and Riverboat Museum

our range. With the condenser, we're getting that extra 15 pounds back; we're not expending any extra fuel or energy to create it," John says.

During the winter of 2021, *Waimarie* came off the river for her 'out of water survey'.

"We did a major," notes John. "We took the boiler out of the boat; had to cut some of the deck out to remove it. The boiler was stripped down to the bare bones, hydraulic tested to one-and-a-half times its working pressure, and then rebuilt. Much of the steel work was 22 years old at the stage; the pressure vessel itself was in good condition, but we needed to establish that and prove it. A lot of the surrounding steel work and insulation was getting past it and was replaced." ▶


Steam valve bonnets ready for inspection

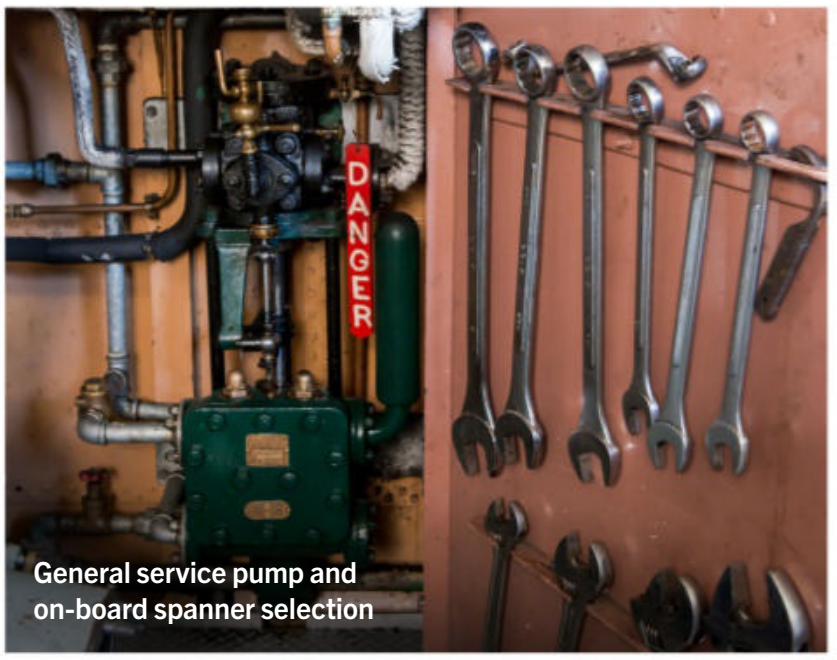
Gauge glass control handles

General service pump

A drip-feed lubrication system for the big-end bearings. “The box is full of oil with a wool wick inside, the tubes go into the bearing top-half . . . Worsted with a straight SAE50 oil,” says John. “We can’t use modern multigrades, [as] they’re designed so that the viscosity increases as it heats up; these never get hot”

Original oil lamp in the Riverboat Museum

Valve or gland packing remover



General service pump and on-board spanner selection

Generator steam engine parts

Obsolete parts kept for reference

Boiler steam valves awaiting TLC

Minor niggles

At the time of writing, the team was also rectifying a few minor running issues like ring chatter.

"We pulled the pistons apart and discovered a very slight chamfer; the sharp edge was scraping the oil off the cylinder bore," John explains. "That was rebored and the piston rings — which were old-fashioned even in their time — were replaced with a new three-ring system which is more effective; much better sealing and just works better.

"There was an issue with the starboard paddle mechanism too. There are a lot of little bearings in it; where there is movement, there is a bearing, and they don't last forever. Every four years, we pull the paddles apart and replace the bearings."

The boat operates in the lower reaches of the Whanganui River, which is greatly affected by the tides, with salt water reaching as far upstream as Upokongaro.

"*Waimarie*'s engine can run on salt water," says John, "but that needs to be cleaned out afterwards, which is quite a performance."

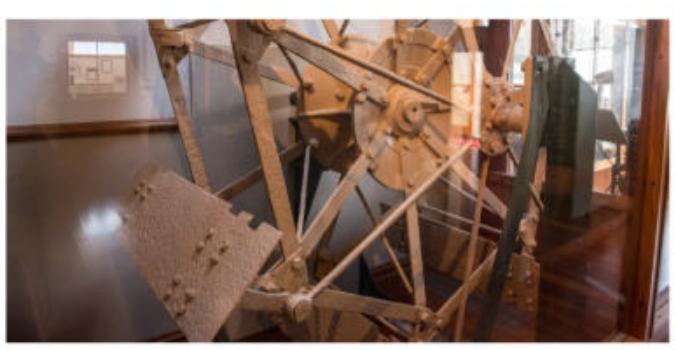
To rectify that, the team is installing a new fresh-water tank into one of the coal bunkers. ▶

(Photo: Courtesy of the Riverboat Centre)

English wheel for rolling plates

(Photo: Courtesy of the Riverboat Centre)

John with big-end bolt and spanner

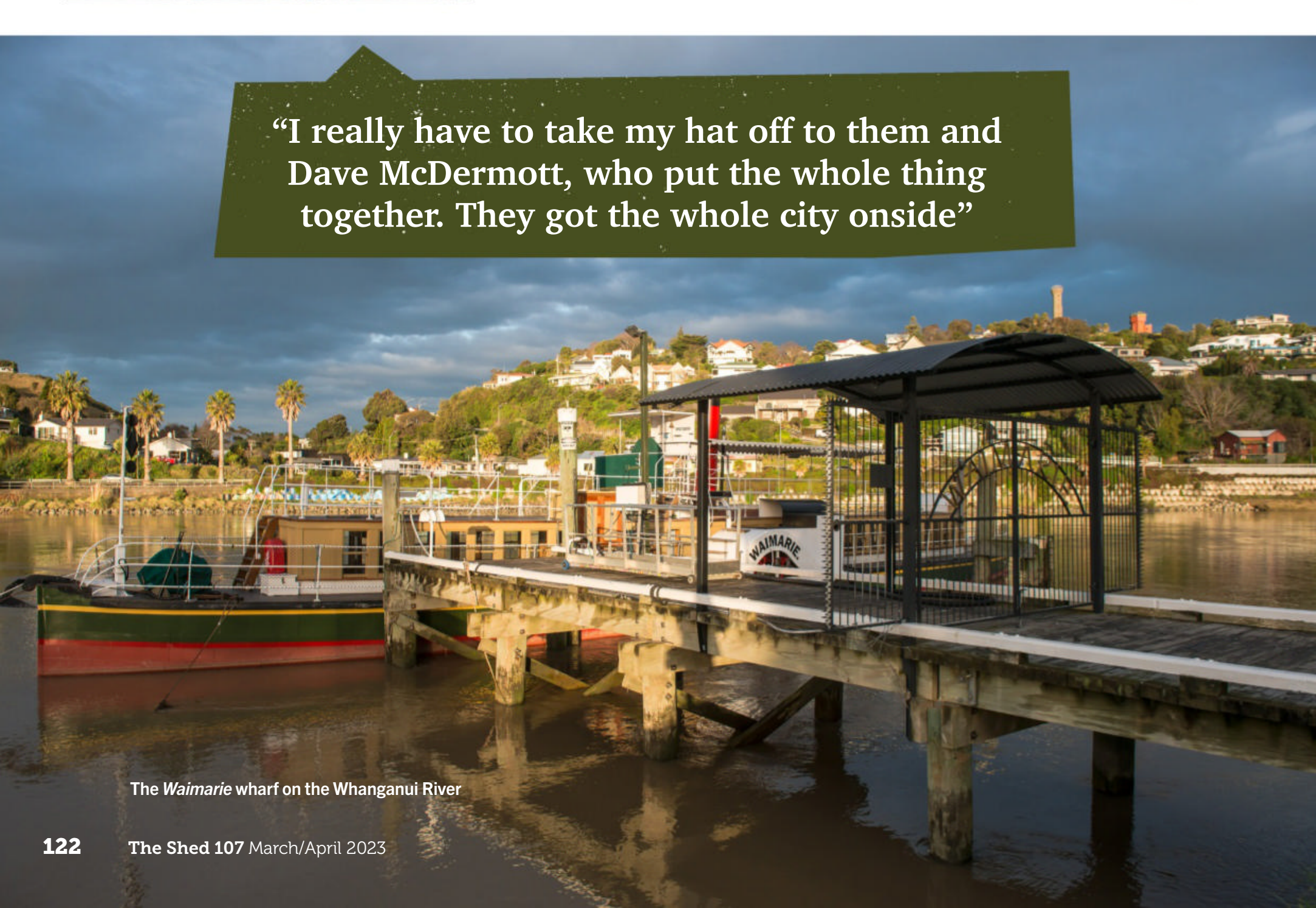


Hats off to the original team

John acknowledges the incredible work of the original team who salvaged the *Waimarie*.

"I really have to take my hat off to them and Dave McDermott, who put the whole thing together," he says. "They got the whole city onside; the amount of time, money, and work donated was amazing. They did a great job, but they weren't marine people, so some things weren't done to marine standards — but they lasted over 20 years. Now, gradually, we are changing things."

"I really have to take my hat off to them and Dave McDermott, who put the whole thing together. They got the whole city onside"



The *Waimarie* wharf on the Whanganui River

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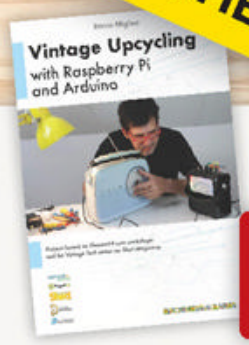

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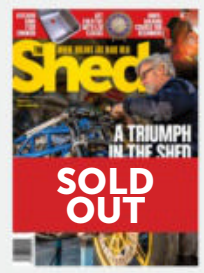

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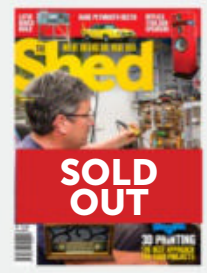

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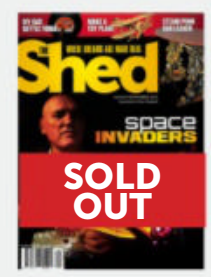

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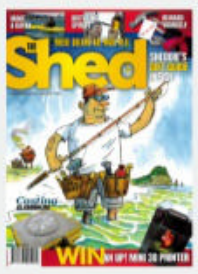

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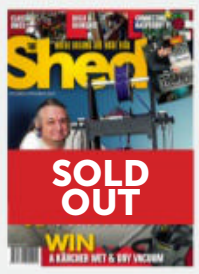

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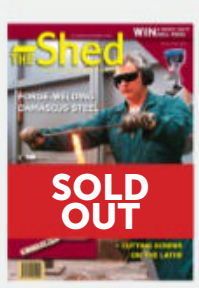

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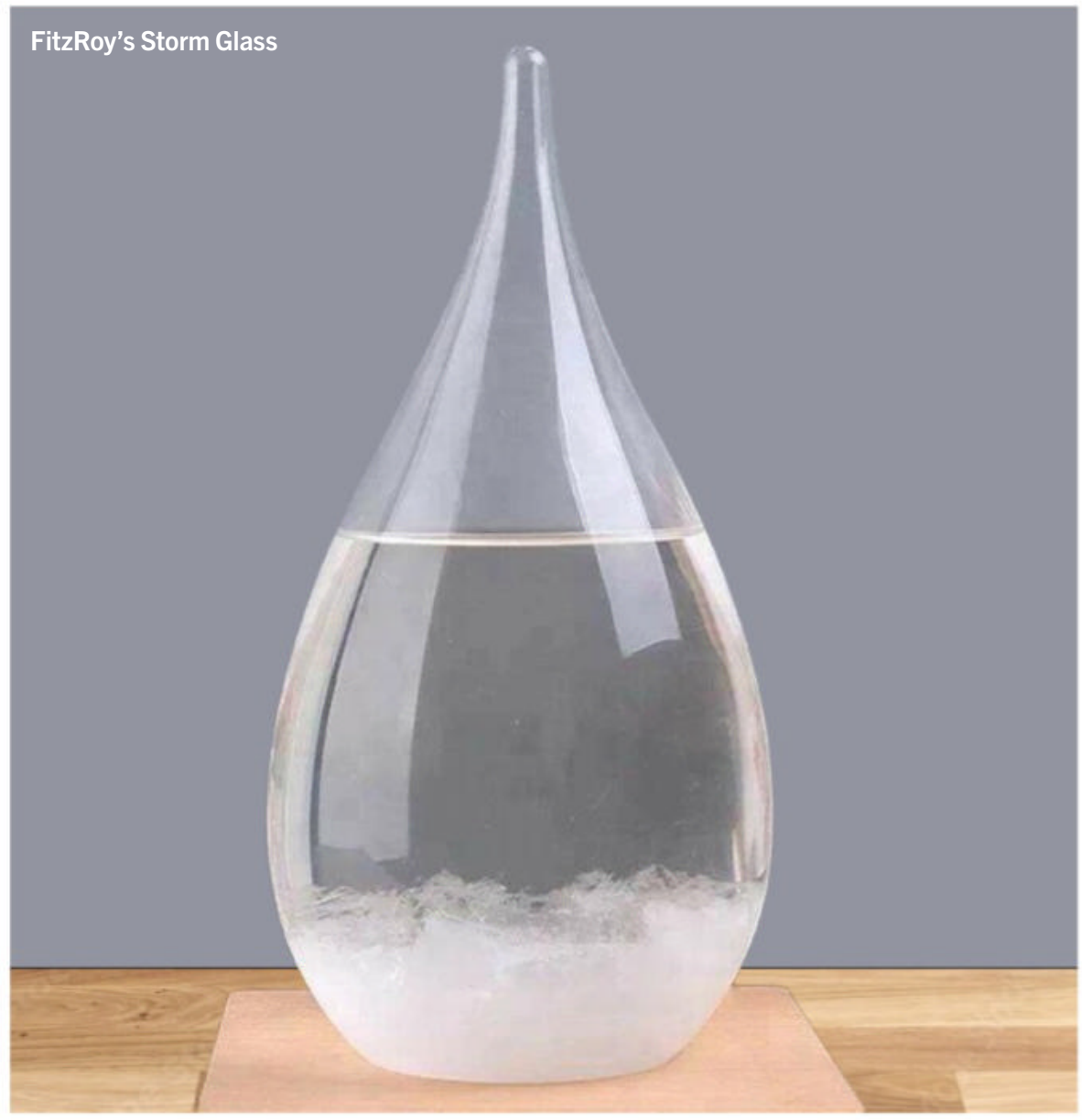
THE RAIN ON THE PLAIN

New Zealand's link to the development of meteorology

By Jude Woodside Photographs: Jude Woodside

Welcome to 2023. At first glance it doesn't appear to be too different from 2022, which, for me, was characterised by far too much rain. As I speak, rain is falling, and has been for several days, and we are told to expect more.

At least the forecasters have been proved right. I have written previously about the predicted persistence of La Niña. You may also be aware that I have been awaiting the chance to get the slab poured for my new shed. There was a glimmer of hope before Christmas but the work was delayed due to the expectation of rain. That rain didn't actually amount to much; things have got worse since.



FitzRoy's Storm Glass

> I think we owe a debt of thanks to the weather forecasters

Credit where it's due

I think we owe a debt of thanks to the weather forecasters. I believe that they have become far more accurate. I can read the forecast for my little valley and it is accurate to within the margin of error in terms of predicting both the type of weather and the timing of it.

I live only 10 minutes from a large town, and the weather there can be wholly different from my own — due to the hills, I suppose. Yet the forecast, specific to my location, is generally quite accurate.

This can't be easy; weather forecasting is dependent on the wholesale collection of data and interpretation of those data using the complexities of fluid dynamics, the mathematics of which would turn your head and is well beyond my pay grade.

Of course, the meteorologists have huge and very powerful computers to assist them, but it is still an impressive feat to be as accurate as they are. I well remember, only 10 years ago, when I still watched free-to-air TV, hearing the ebullient weather person declaiming "sun, sun, sun" even as the rain thundered down on the roof; we continued to have the 'sun' drowning us in 'sunbeams' the following day too.

A thing of beauty

New Zealand has a not-well-known link to the development of meteorology.

On his return to England, our second governor, Captain Robert FitzRoy (26 December 1843–18 November 1845) — previously the captain of HMS *Beagle* — set up the beginnings of what would become the Meteorological Office (Met Office). He established FitzRoy Storm Barometers in ports around Britain primarily for fishing boats. FitzRoy also developed a system of weather data collection using the captains of ships to record weather conditions on their voyages.

The FitzRoy Storm Glass (barometer) is a thing of beauty — a sealed glass containing camphor, potassium nitrate, and ammonium chloride dissolved in ethanol and water, which selectively crystallises in various ways according to the weather. FitzRoy developed the Storm Glass during his *Beagle* trip, based on previous French and Italian versions. There are instructions online on how to build one, and I plan to make one for myself in the near future — weather permitting.

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