



words Pat Skene and Sandy Grant

images Sandy Grant and Steve Kempson

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THE WONDERS OF HAVING YOUR OWN CNC MACHINE

I'm a sucker for cool tools. I always imagine the ultimate work shop and what would be in it.

Wouldn't it be great to have the skill and the knowledge to be able to design and manufacture your own slot car parts in your own work shop.

Sandy Grant a slot racer in the UK can. He has invested in a CNC (Computer Numerically Controlled) machine.

The CNC machine used is a Stepcraft 2, gantry router, capable of machining most

non-ferrous materials such as, wood, plastic, aluminium, brass but, not steel or other, ferrous materials. The machine comes in kit form and, if you can assemble a slot car, you can assemble the machine.

It's German designed and manufactured to the quality standard you'd expect. The same machine can, with additional kit, be used for 3D printing, laser engraving and cutting, vinyl cutting, data capture (using 3D probe) and a number of other tasks.

More info from <https://stoneycnc.co.uk/stepcraft-overview/> the UK distributor or <https://www.stepcraft.us/>.



I asked Sandy how he got started.

“I principally use the machine for supporting my industrial design work to produce proof-of-principle and appearance models and have also taken on work for furniture makers and other non-specific jobs, such as proofing laser cutting data, subsequently used for the manufacture of exhaust and turbo manifold plates for car engines.

Then, along come slot cars - it's a very useful machine for these too - but, of course!

I initially ran a number of Thingie designs I had on my CAD, thru the CNC, with the intention of making vac form tooling and, with a home-built former, pulling some shells. Starting with some concept sketches, then modelled in CAD, converted to CAM and cutter path data, I fired up the CNC and, to my delight, what I thought could be did, indeed, be!

Okay - long story short. I'll let the pix do the talking so, to summarise, I've made vac form tools for Ian Howard of Scuderia 66, working from his excellent drawings and references, brass parts for Steve Kempson/Bob 'The Legend' Hallums (drop arms, including joggle-bend for guide and side pans) in both small batch runs and solo parts for Rod

Morrison (end bell plates) as well as tech tools for car spec compliance and set-up plates (aluminium and acrylic) and am currently exploring chassis parts such as motor brackets/base plates, front ends and other parts besides - some orders for these too. I've used CNC, as a designer, for many years and using CNC for slot cars is, of course, not new but, for me a fascinating means of production that introduces great precision (from +/- 0.1mm or less), repeatable results leading to small production runs, both 2D (e.g. chassis parts) and full 3D (e.g. vac form tools) machining and, importantly, the ability to part-cut-thru (i.e. pockets) both simple and complex shapes that, otherwise are not typically techniques builders attempt – scratch built chassis parts have, traditionally, been thru-cuts with hacksaw or dremel. With CNC there's a whole different world to explore now.”

I asked Sandy how the process works.

“So, for something like the brackets I have been making, the process starts with drawing the shapes with a CAD programme – I use Solidworks but, there's many different types available – some free to use. Before CAD, it would be the drawing board, T-square, adjustable set-square, circle templates and a hacksaw – okay but, I'm not going retro with these again!

I then use another programme - V Carve by Vectric – to create the CAM (computer aided machining) information that directs the CNC machine as to what cutter paths to follow, how deep to make cuts, what speeds (for the cutter - rpm) and feeds (how fast the cutter will follow the cutting paths – mm per minute) are required and other such data. This is kinda like setting up a slot car – get it right and it runs sweet but, get it wrong and you end up with broken cutters and scrap brass. I'm over that stage now. Um, maybe shouldn't have said that!

That's all software and next comes the hardware side of the process.

Staying with the brass brackets, as the example here, I attach the blank workpiece onto a worktable mounted on the bed of the CNC machine. Suitably leveled to within 0.05mm, I typically use MDF or melamine faced board for the worktable and superglue the brass blank to its surface – it's quick, secure and, unlike double sided tape, clean to cut thru. The CNC is fired up and from an adjacent laptop, the cutting data is sent to the CNC's processor which, in turn, tells the X, Y and Z motors when to run and when to not run i.e. hold position.

After, say, 15/30 minutes running, the cutting is complete and the machine

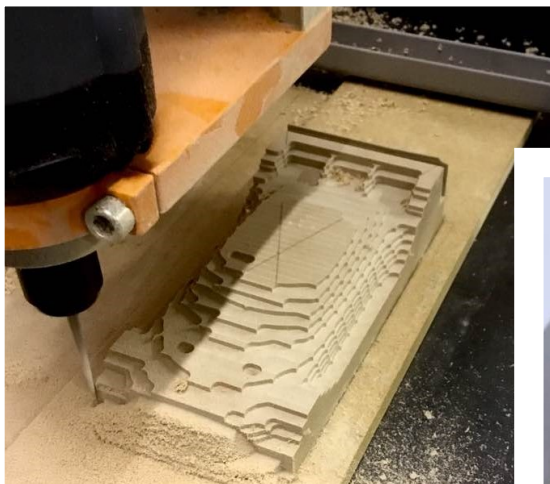
fully switched off. It's not a big machine but, with cutters running at 10 to 25K rpm and the stepper motors delivering a fair amount of torque, it can very quickly become quite dangerous and chew it's way thru, firstly, itself and then the operator! Running to a procedural routine, each and every time, with safety built in, is essential, I've found – yes, you learn thru errors, as well!

I remove the now, perfectly cut, part from the worktable with the application of heat from a small blowtorch – this degrades the superglue such that it simply lifts off – once it has cooled down!

Job done.

3D forms, such as for vac forming tools, use essentially the same process but require a few more steps and clear thinking in full X, Y and Z. Again, software helps enormously here and the whole machining process can be simulated, to check for any goofs or clashes, before running it for real.”

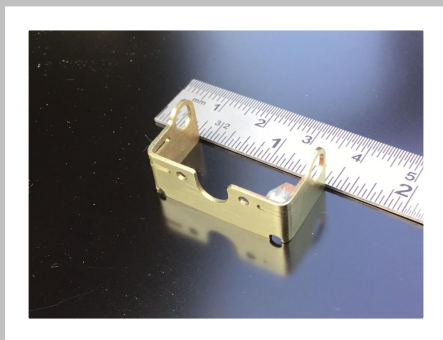
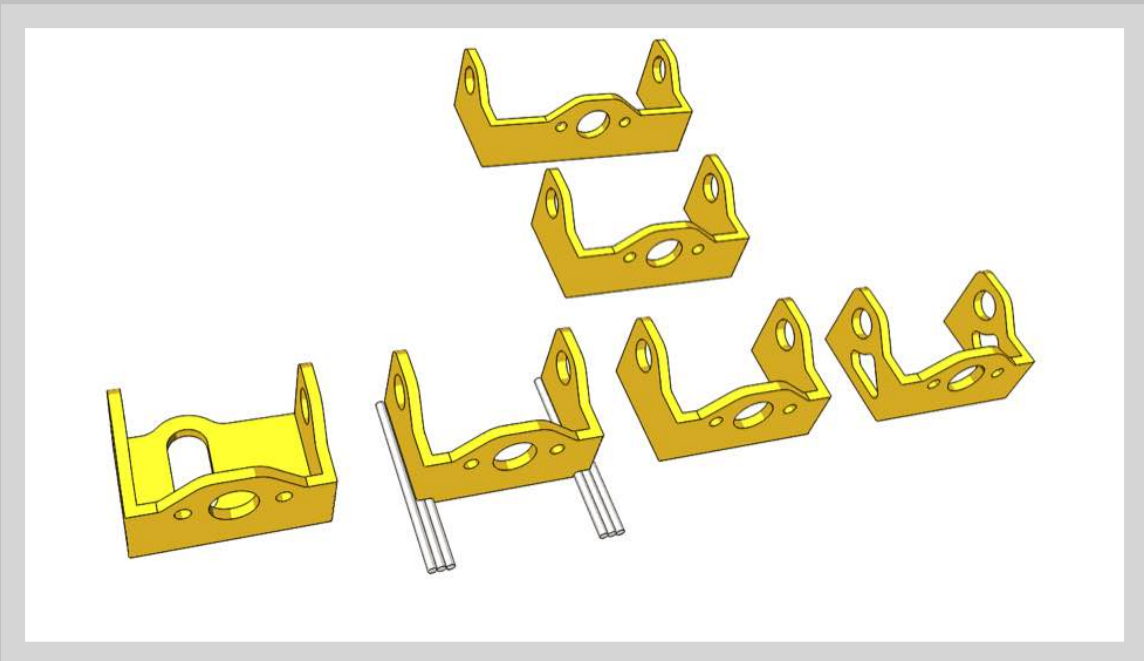
So off you go if you're clever enough! The big draw back for me apart from the cost is someone would have to teach me how to use CAD!



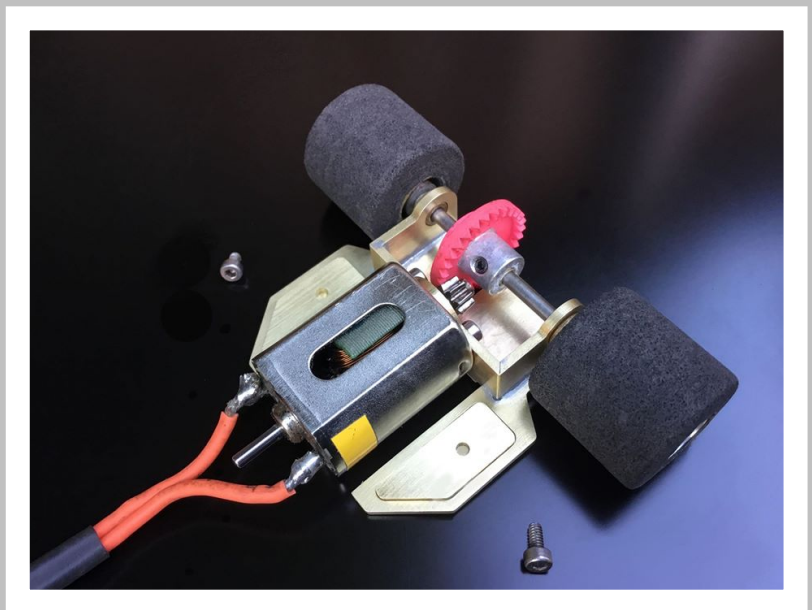
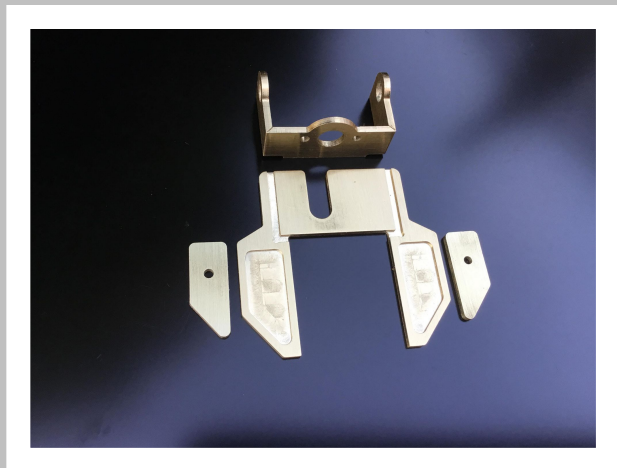
From this to this. Sandy cuts a mould for a vac formed body shell for Scuderia 66.

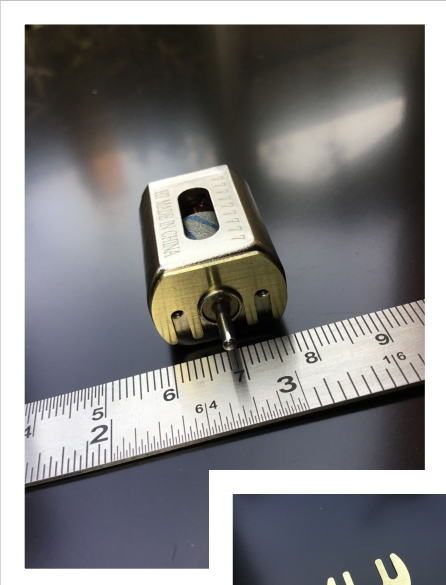


One of Sandy's original vac formed Thingies.



From CAD file to machined part. Exquisite I love the bevels Sandy puts in to act as fold lines for brackets and the like.





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Some drop arm parts machined and formed for UK slot racer Bob Hallums.

