

Styrotech CNC has the experience and ability to undertake a wide range of precision cutting and machining projects. Whether it's precision profile cutting of MDF, Plywood, or another type of wood, plastic or foam, or the design and cutting of intricate organic shapes, engraving, the manufacture of a complex geometric structure or your specific requirements, Styrotech CNC Ltd. have forged a name as industry leaders for contract CNC services.



## SUMMER/AUTUMN 2015

**Geometry is Styrotech CNC's newsletter. It gives an overview of what's happening at Styrotech, a look at some of the work we've done and how what we've done might apply to your next project.**

In this issue we've got another interesting demonstration of how the different technologies we regularly use - CNC machining, CAD software, 3D digital scanning and the latest 3D printing equipment - can work effectively together to create solutions to a wide range of different problems.

The boat - the **OC300** (pictured above) - conceptualised by Russell Carlyon, designed by Kevin Trotter, moulds cut and created by Styrotech CNC and ultimately built and marketed by Russell - is now on the water and achieving its design potential. Test-pilot (Russell) commented that "...in true Trotter style, it f\*\*\*\*\* rips" (In Russell's words).

The range of work that moves in and out of the factory continues to impress both in its diversity and challenge - we've got an overview of some of the more interesting projects we've worked on recently. An excellent demonstration of what can be achieved is summarised in this issue's case study describing the creation of a customised engine mount - you can learn more on page 2.

Now we're closing in on the end of the financial year, the factory is busier than ever indicating that this will be one of the better years in recent memory, a result everyone here is very proud of.

As we move through 2015, we're looking forward to continuing to provide you with the same level of service, innovation and competitiveness you've come to expect.

### Software Partners:

alphacam

3D  
SolidWorks

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XOS

FORMSYS  
HAZSURF • SUBCONSTRUCTOR  
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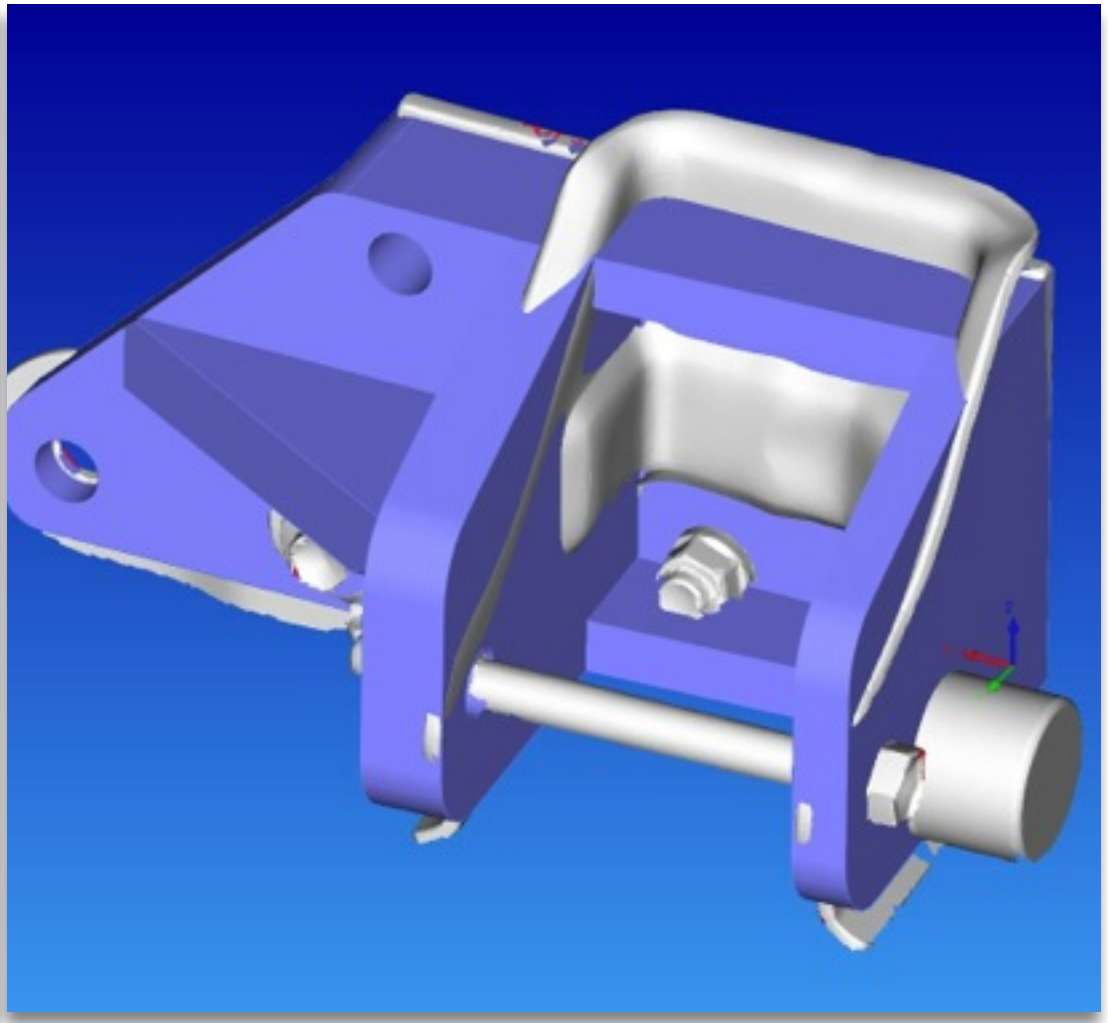


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*Main image:*  
The original part (grey) has been scanned and CAD generated. The new part (blue) has been designed to align with the mounting points on the original part.



## COMBINING TECHNOLOGIES 3D Scanning, CAD, CNC and 3D Printing

In the last issue of **Geometry**, we looked at how FormScan & Styrotech CNC worked together to re-create the transom of an 'A' class sloop, *Ngataringa*, that had been damaged. In this issue we're looking at another example of how **3D SCANNING, CAD DESIGN, CNC MACHINING** and **3D PRINTING** can combine to create solutions. Here the example is how a new mounting bracket for the engine in a car was custom designed, manufactured and fitted into the existing engine bay.

The project objective was to fit a new engine into the engine bay of an existing car. The new engine was slightly larger than that which the car was originally designed for and equipped with – a 1600cc in

lieu of a 1000cc. Aside from the cubic difference in engine size, the new engine was 50mm wider, thus it would not fit onto the brackets used to mount the engine.

To fit the new engine in the car required a new mounting bracket which needed to be strong enough to legally hold the new engine, and cope with the increased torque. Essentially the revised mount needed to be redesigned.

In order that the new engine mount would fit into and align with the mounting holes in the cars' engine bay, the original engine mount was scanned, thus determining exactly where the mounting holes were located.

**Top left:**

This image shows the two engine mounts. The lower mount is the original; this was scanned and then used as a basis to create the new mount, the 3D printed version of which is light blue.

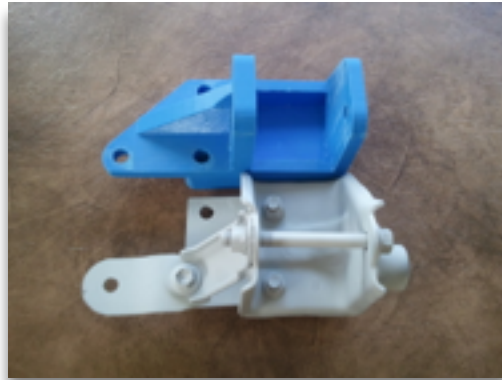
**Lower Left:**

This shot shows the 3D printed prototype part test-fitted into the engine bay, confirming the correct location of the mounting holes.

**Lower right:**

This is the finished part - cast in aluminium.

Using the scan as a starting point, a new engine mount was designed using Solidworks “on top” of the scan of the original mount. This ensured the alignment of the mounting points was correct, and the new part would fit in the existing engine bay.



Once the CAD for the new engine mount was finalised, next step was to get it 3D printed; this was done with a 3D printer using a corn starch polymer. Once ‘printed’, the engine mount could be test fitted into the engine bay to ensure that it fitted correctly.



Once the design was confirmed, the ‘new’ engine mount needed to be cast using a process called ‘ceramic shell casting’. The object was first covered in multiple coats of liquid ceramic, which is then hardened in an oven, creating a hard, durable crust around the outside of the object. At the same time the ceramic crust hardens, the cornstarch polymer that was used to create the shape of the object) ‘melts’, thus creating a void, and hence a mould for the shape of the part.

The newly created mould is now filled with liquid aluminium. Once the aluminium cools, the ceramic ‘crust’ is broken off, leaving the shape of the object, ready for installation in the engine bay of the car.

By combining scanning, CAD design and 3D printing, it’s possible to develop solutions to a range of engineering challenges that can be resolved through the creation of a mould. This particular approach – ceramic shell casting – is particularly applicable when the objective is the creation of one off, custom moulds.



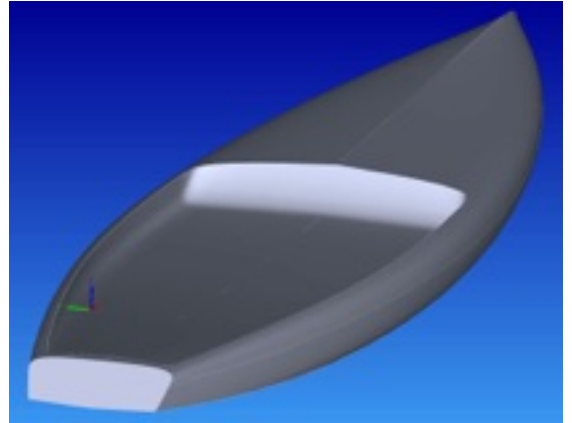


# STYROTECH CNC: PORTFOLIO

We've been fortunate enough to work on some really interesting projects over the last few months.



Using a design prepared by Kevin Trotter based on a concept created by Russell Carlyon, Styrotech CNC machined the hull and deck moulds for the OC 300. This is a 'hard shell' (not inflatable) offshore cruising tender designed to improve on and replace the often seen 'rubber duck'.



This trophy was interesting in that it needed creative (and innovative) CNC strategies to get the job done. The finished object uses glass panels to create an interesting and unique finish.



**Top left:**  
The first OC300 hull off the mould. This boat is now on the water.

**Middle left:**  
Two Div II windsurfers on the wind. The unique Div II hull shape can clearly be seen.

**Bottom left:**  
The Div II as designed by Kevin Trotter. This board has been cut and is under construction.

**Top right:**  
This is the CAD of one of the many SUP's we cut.

**Middle right:**  
Project Litefoot Trophy

**Bottom right:**  
3D Digital scan by FormScan 3D. This scan was used to locate mounting points and the crankshaft for the new engine.

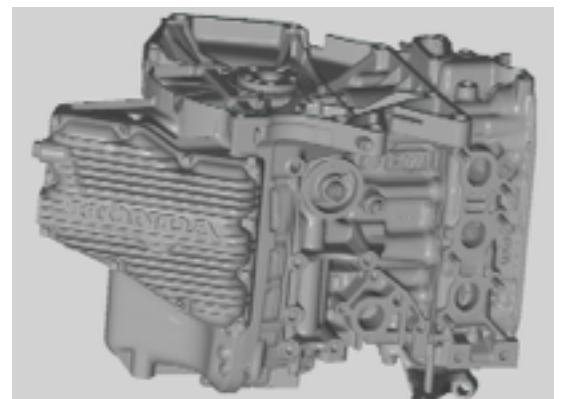
Though no longer a common sight, they have a dedicated following. In a concept that is the epitome of Div II windsurfer design, this board (by Kevin Trotter), has been designed and is to be built as the ultimate Div II.



Staying with marine, one of the constants around here are the range of SUP blanks that are designed, CNC machined and prototyped for testing.



A project that FormScan 3D worked on (and can talk about!) was a scan of this engine. The objective was to capture and locate the mounting points and crank shaft in order that a new, electric engine can be mounted into the engine bay of the existing car.



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## UPDATE: NEW CNC MACHINE BIESSE SKILL 1224 G FT

New in October 2014, Styrotech CNC took delivery of a new 3-Axis CNC machine, a Biesse Skill 1224 G FT. Replacing Styrotechs' original SCM R2 3-Axis and bringing to an end 21 years of faithful service (it was delivered to NZ in 1994!), the Biesse Skill brings with it high levels of automation, enhanced processing speeds and faster cutting times. Now fully utilised cutting rudder and centre-board cores as well as sign writing and sheet cutting, the Biesse Skill is not only tidy, it's fast, efficient and is good at finishing 2D and 3D cutting jobs.



## Check out our Facebook Page!



With two – three weekly updates, the number of people who have taken an interest in our page is continuing to grow.

Check it out – it's a good way to stay tuned in to what we're up to, and how some of the work we do might apply to your next project.

So if you're looking for up to date information on what's happening at Styrotech CNC, check out

## FormScan 3D

FormScan 3D is New Zealand's leading provider of 3D Scanning for Engineering, Inspection and creating CAD Data. Styrotech CNC works closely with FormScan in order to help bring to reality a wide range of projects.

The website has an interesting portfolio of the work that FormScan has done, including projects that were completed in conjunction with Styrotech CNC.

To learn more about FormScan 3D, the work they do and how they can help you with your next project, check out the website ([www.formscan3d.co.nz](http://www.formscan3d.co.nz)), or the Facebook page ([facebook.com/formscan3d](https://facebook.com/formscan3d)).



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