

The technology race is on

With most racing programmes now closed, the motorsport sector is in its busy development season. Steed Webzell reports on the latest technology taking the strain



Super Aguri F1 is using a Metris LK CMM with 2,500 by 1,000 by 800 mm envelope to measure complete race car chassis

The UK motorsport sector employs 50,000 people, with more than 30,000 of these engaged in full-time engineering roles. There are about 4,000 UK businesses of various sizes involved in motorsport, including several Formula One teams, Formula One engine suppliers and World Rally Championship teams. This, of course, is only the tip of the iceberg. The UK also hosts many other types of motorsport, at both national and club level, including Rallycross, SuperMoto, Scrambling, Sportscars and GT championships. Many of these vehicles, along with various specialist components, are designed and manufactured in this country.

The winter is a busy time for

motorsport manufacturing facilities with development engineers eagerly waiting to test newly designed parts for next season's car. To help ease the workload, many will have invested recently in new machine tool technology.

A case in point is High Wycombe-based sub-contractor Erode-All. Central to the company's purpose-built manufacturing facility are four Sodick wire eroders, a Sodick fast-hole drill EDM and, its most recent acquisition, a Sodick AQ35L spark erosion machine, all of which were supplied by Sodi-Tech EDM.

Erode-All's versatility and in-house machinery equips it to make a wide range of components, such as wishbones and manepanes for wind tunnels, and torsion

springs, torsion tubes, front anti-roll bars, end fittings and uprights for suspensions. The company also has many years' experience manufacturing critical engine and gearbox components. Scavenge pumps, clutch pullers and pushers, jets, gerotors and gear ratios can be manufactured both quickly and efficiently. Parts requiring involute gears, ANSI and DIN splines, can be developed using Erode-All's in-house software, before being wire or spark eroded.

Typical materials processed on the company's array of Sodick EDMs include titanium and metal matrix composites. With tolerances often in the realm of 0.010-0.015 mm, there is little margin for error on these expensive components.

"Sometimes we are looking at £1,000 worth of material before we even think about machining," says managing director Glen Tavender, "so there's plenty of pressure on us to get it right."

As mentioned earlier, motorsport is far more than just Formula One. Dunstable-based Rage Motorsport, for example, has a rapidly growing business designing and manufacturing multi-terrain buggies powered by six-speed 180 hp Honda Fireblade motorcycle engines that reach a top speed of over 100 mph. The top-of-the-range Rage weighs just 375 kg and does 0-60 in just 3 seconds and is equally at home on the racetrack as it is off-road. It's no wonder the orders are stacking up. To meet

demand, manufacturing operations are undergoing a major overhaul.

"Until recently, we'd been sub-contracting all the major machined parts," says sales director Joe Adams. "However, if we were going to grow the product range and the company, we realised we'd have to take responsibility for all the quality critical operations."

The company duly invested in a Haas TL-25 CNC lathe with sub-spindle and a Haas VF-2 CNC vertical machining centre, which have been set to work producing a wide range of buggy parts, including front and rear hubs, uprights, discs, ball joints and exhaust flanges.

"Installing our own in-house CNC machining facility has brought financial benefit, too," says co-founder and director Steve Gentil.

"Not only have we gained greater control of our production schedules, enabling us to be more productive, but

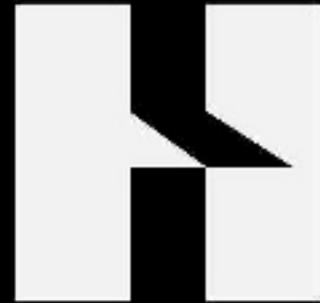
When microns mean better lap times

Next year will be Super Aguri's third Formula One season. Last in the Constructors' Championship in 2006, the team climbed to 9th in this year's campaign. With further gains anticipated in 2008, some of the credit can be claimed by Metris which, as official metrology equipment supplier to

the Super Aguri F1 Team, manufactured and installed an LK co-ordinate measuring machine large enough to accommodate a complete race car chassis. In addition, Metris has supplied 3D laser scanning heads and software to upgrade the performance of a pre-existing Faro portable arm and a smaller Mitutoyo CMM.

Super Aguri F1 Team's financial constraints as a new entrant in a super-rich sport, allied with a need to use high-end metrology equipment to compete effectively in races, was a fundamental dilemma. The original measuring equipment was able to cope in some areas. However, the larger structural elements of the car could previously only be inspected using the Faro arm, which was capable of no more than ±30 micron measuring accuracy, insufficient to chase those all-important lap time reductions measured in fractions of a second. Moreover, comprehensive checking of profiles and surfaces was impossible by single-point probing on the Mitutoyo or Faro machines in the very short time available between races.

So there was enthusiasm among the directors of Super Aguri F1 when Metris approached them offering to provide an LK CMM with 2,500 by 1,000 by 800 mm measuring envelope capable of ±2 microns volumetric accuracy. The metrology supplier also suggested using Metris laser scanning heads and software on all three measuring machines to speed the inspection of features and surfaces.



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The top-of-the-range Rage weighs 375 kg and does 0-60 in 3 seconds – orders are stacking up

we've also cut piece-part costs in half."

Of course some sports cars double up as road cars anyhow; arguably the best example being the Caterham Seven. The Seven's enduring popularity owes much to the company's ethos of 'adding lightness'. However, while the traditional tubular chassis is still instantly recognisable today, the method of

manufacture has undergone radical change. One of the most significant productivity improvements in recent years has resulted from a switch to tube laser machining of the numerous components needed for the 10 or more variations of the Caterham Seven chassis produced every week by subsidiary company Steel Fabrications.

Based in Westbury, Wiltshire, Steel Fabrications uses a BLM Adige LT120 LaserTube to cut and profile steel chassis components prior to welding. Supplied by BLM Group, the LT120 takes up to four tons of 6.5 m-long tube in its bundle loader, nests and cuts parts to an accuracy of 0.1 mm. As well as cutting and notching tubes for chassis, wishbones and A-frames, the LaserTube's diffusion cooled CO₂ laser source pre-cuts rivet holes in the chassis components, thereby reducing significantly the time taken to

attach body panels.

Another motorsport company specialising in tube processing is SS Tube Technology, which has recently installed a Vapormatt wet blast machine as part of a dedicated surface cleaning and preparation cell at the company's exhaust production and refurbishment facility near Witney in Oxfordshire.

The new machine – a Vapormate 3, with a 995 by 700 by 700 mm processing enclosure – is used primarily in refurbishment to thoroughly remove heat scale and other surface contamination from exhaust systems prior to inspection and any necessary reworking. The systems designed and manufactured by the company are often complex and expensive to produce, made from materials like 321 stainless steel, Inconel or other exotic alloys, so maximising their operating life makes economic sense. □

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