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MAY 2015
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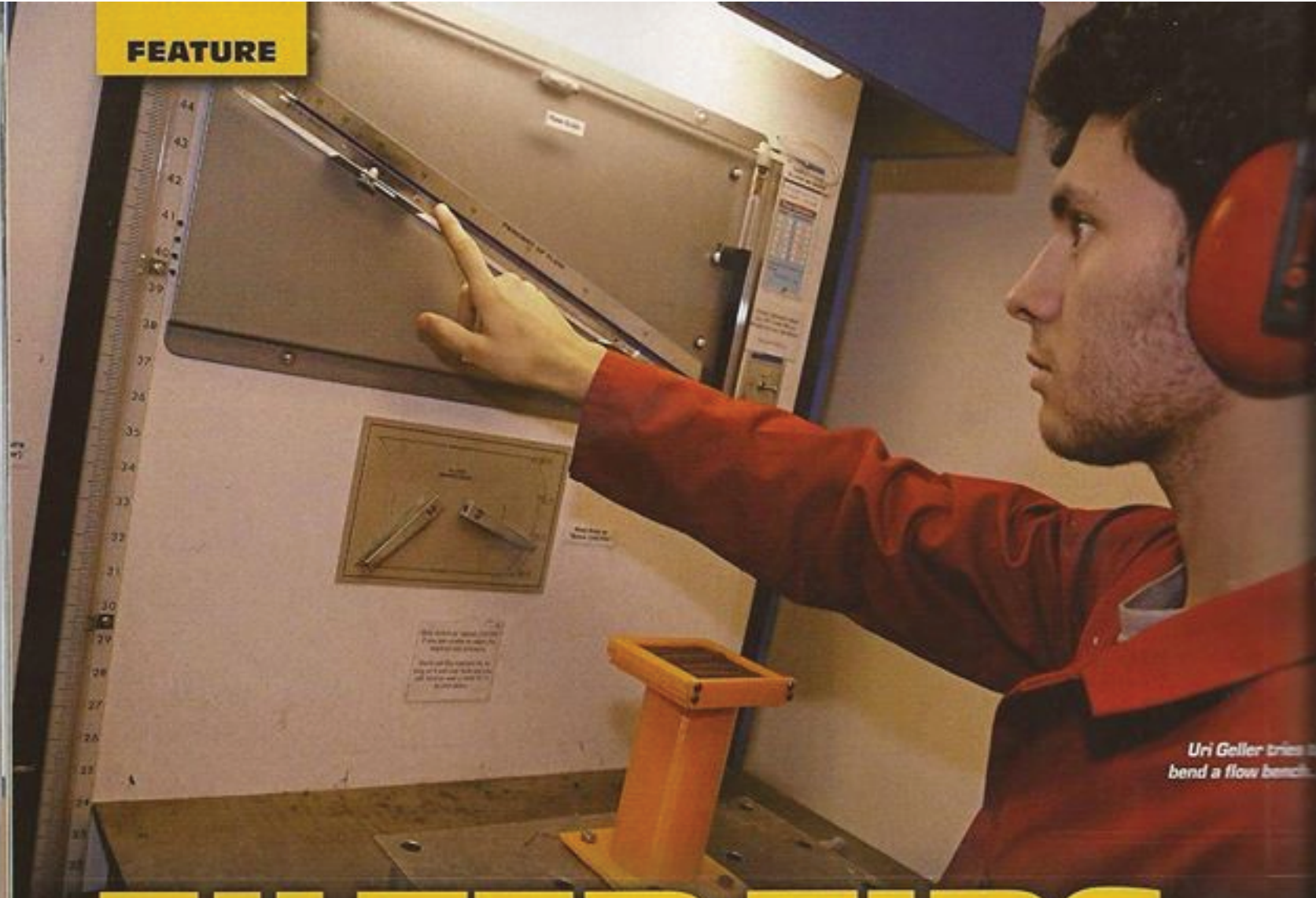


Uri Geller tries to bend a flow bench...

FILTER TIPS

Air filters, like Tunes, help your bike to breath more easily. But which one?

We know many of you guys and gals spend big bucks on modifying, with exhausts, fuelling modules, other electronic gadgetry and dyno time proving (sometimes) more of a priority than the rent. But air filters don't get the attention they deserve. Getting fresh air into an engine is essential. Any limitations to air flow are a bad thing when it comes to performance.

Air filter manufacturers have spent years developing maximum air flow alongside engine development. Of course, standard production-based bikes don't require the outright performance of race-spec motors, so keeping the crud out for longevity reasons is more significant than horsepower gains. This means very restrictive OE filters that look more like dustbin lids, so aftermarket companies offer performance solutions.

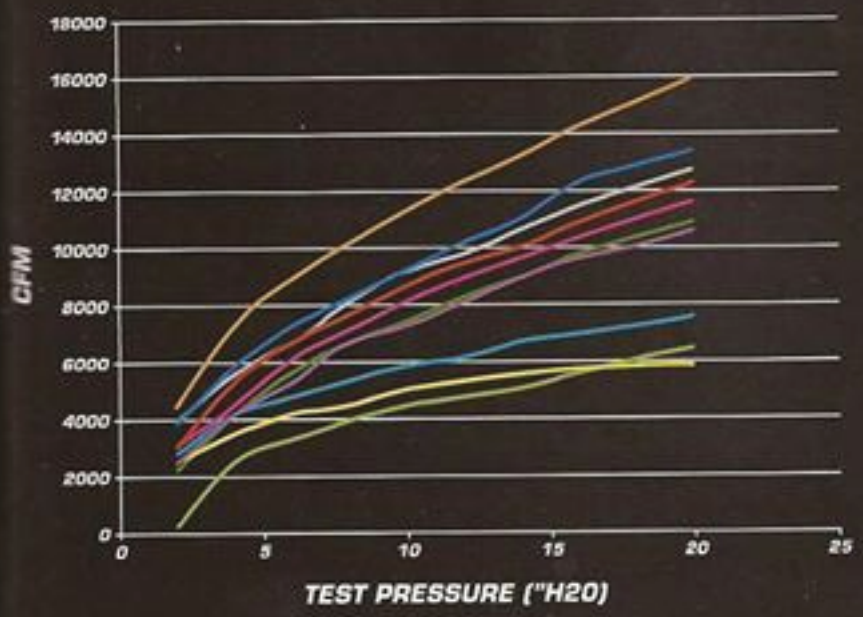
FB regulars will know through previous features, the boys at the University of Wales – Trinity St David in Swansea – and more prominently, Team V4 Racing. George Douglas, Francesco Cavalli and Craig Shreeves are students at the university, and combine work with pleasure by running the race team; Fat vs Thin, remember?

It may sound obvious to some, but during their racing activities involving Team V4 Racing's Honda NC30, the boys discovered (unsurprisingly) that by removing the air filter and airbox, performance was drastically improved; all very well if the engine is rebuilt frequently and the bike isn't crashed, but it was soon evident the risks outweighed performance gains. That got them thinking.

So the trio put together an air filter test, gathering various aftermarket elements from MWR, Sprint, K&N, Pipercross, DNA and BMC. Max air flow testing was carried out at the university using the clever equipment and facilities they have at their disposal, before getting properly technical and analysing samples of each filter under the microscope to understand design and structure. The final slice of the test involved using engine simulation software.

The Test

To measure air flow, the test was based on the SuperFlow SF600 flow bench at the university, which is, essentially, an air filter dyno. This allows a constant/consistent air pressure that mimics an engine's requirement, something that you'd never get on a dyno. The flow rate was measured in litres per second. To ensure a fair test, with all air filter materials maintaining their original shape and layout, the boys



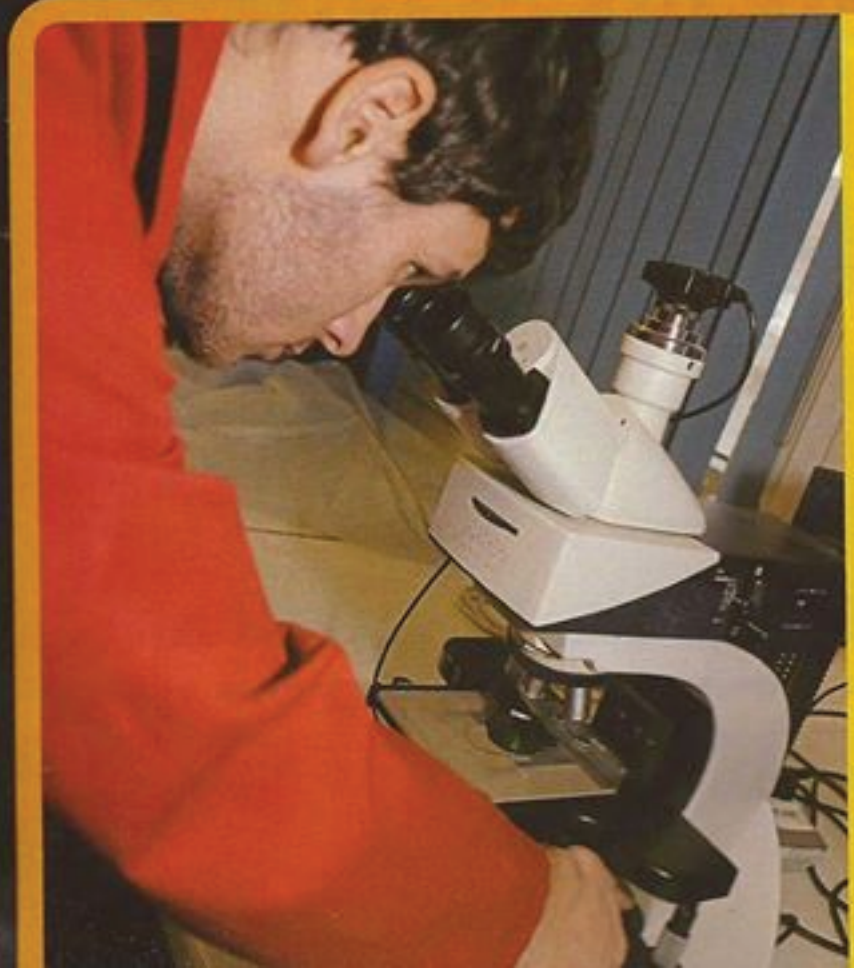
constructed a purpose-built rig from a 3D printer. Clever, eh? A 95mm by 95mm slot at the top of a vertical tube that fed the air was used to house the filters. Fire it all up!

The results:

As you can see from the results graph, the Sprint Filter boasted the best flow rate by far. There are also three obvious groupings of filter elements; the single-layer polyester of the Sprint at the top, the middle show the woven cotton gauze filters, and the bottom couple show the oil-based sponge filters.

Of course, this test was based purely on air flow, and there may be some differences on the frontline in an airbox and bike-specific variances, and we know how well the MWR has done in real-time tests. But if we're talking getting undiluted air into the engine, the Sprint and its P08 material offers the juiciest route for air, which is a surprise given how small the perforations are in the Sprint's element.

Kraftwerk's latest concept album took the form of a visual instillation in Wales...



WORKING OUT WHAT HAPPENED...

We asked George Douglas, one of the clever trio, for his thoughts on the air filter results.

"What we wanted to ascertain was what filter provides the least resistance to air flow. This would be the same result whether ram air was present, or not. The effect of the filter will create a hindrance of air flow into the engine which detrimental to performance. The key to performance is getting as much air as possible into that engine. If you look at the graph, you can see how low MWR flows compared to K&N, and Sprint, etc. I would expect you to get a huge increase in performance running one of those filters. As you can see, the polyester single layer filters used by Sprint flow much better than any other brand. The next group is cotton based multi layer filters and also Sprint Filter's waterproof material. The reason these flow less is because the airflow has to negotiate between two and four layers of overlaid cotton. This obviously isn't going to flow as well. Finally it's the oil based sponges. These really don't flow very well compared to other types for obvious reasons – the sponge has a completely irregular pattern so flow will be tough, combined with the oils that are used that will also slow down flow. Overall, the best flow comes from uniform polyester filters and then goes into cotton based and finishes with sponge. Then based on our microscope analysis I don't see filtration being an issue for Sprint Filter."