The Sporting Trials Diff Solution

The debate around the suitability and types of differential used in trials cars has bubbled for several years. Sticky and Iffy diffs have become the stuff of legend. Throw away remarks, often aimed at winners, are fun at the time, but do cut deep, we are not a past time and a sport of bullies, but we are a sport filled to the brim with idle banter, and long may that continue.

To get anywhere with deciphering the various attitudes towards diffs, as a community we needed to understand it, and understand what we wanted to achieve. For everyone this was to create a level playing field in regard to diffs, and come up with a solution where diffs could be tested against an accepted parameter.

Various ideas of testing diffs have been looked at over the last 18 months, the one that rose in favour was the “Sharp” test, which very accurately records the breakaway torque when each wheel is independently put under load. You can call the machine a “Chassis Dynamometer”, it works by connecting both wheel hubs separately to large lorry sized disk brakes and then measuring the torque produced on the callipers via electronic load cells and feeding this information into a computer.

Most cars have now been tested, without going into detail there was a big disparity between cars that had a diff fitted with needle rollers and those that did not. Diffs without needle rollers showed on average 30 to 40% higher readings. This is though what was widely expected. The test showed no real difference between the various non needle roller diffs, which included the heavily criticised SuperDiff, the tests included Suzuki and Elite diffs and they were all very similar in their readings. Again unsurprisingly much higher readings were taken from cars with known warn diffs fitted, and this again was across the different makes.

So in summary, we have a test that is trusted, a test that proves that needle rollers are the most free of the diff types and a test that proves that warn diffs will give a higher reading.

It has been suggested by several that we should move to only using needle roller diffs in sporting trials. I don’t agree, I believe that we should be encouraging as many cars out competing as possible and anything that we put in place that creates a block to that will see a further decline in competitor numbers. We may though see a natural move to needle roller diffs, they are longer lasting and are pretty much guaranteed to pass the “Sharp” test. The latter implies that non needle roller diffs might not pass the test, this is true.

The various tests that have taken place this year, show cars ranging from 8Kg to 24Kg in their breakaway readings. A car in the high teens and twenties is deemed to probably have a warn diff that needs looking at, or is one that’s fitted with a diff that has been over shimmed and artificially tightened.

When tested almost all of the needle roller diffs, flat line in their readings whatever load is applied. With most of the non needle roller diffs we see small spikes, or the diff hanging on slightly. Each test has around sixty readings taken across the left and right side of the car and at different loads. Each set of test results has had the highest three of the sixty readings removed. This takes out those peaks and anomalies, and produces some very comparable data.

A peak parameter figure of 18Kg has been decided upon for the 2019 season, this encompasses all the cars that have been tested, with the exception of a couple that had warn diffs. This figure will be in the championship rules as the allowed parameter for the 2019 season. Testing of cars with the "Sharp diff test" will take place throughout the year. Any cars that test below 15Kg will have their diffs sealed and considered acceptable. Any cars that test between 15Kg and 18Kg will have an advisory that they could tip over the 18Kg mark if their diff wears. Drivers who's cars go over the 18Kg parameter will lose all the points accrued so far and be asked to change their diffs if they intend to compete for championship points.

Drivers are asked to provide a means of sealing, one option would be to have two adjacent nuts or bolt heads on the diff casing drilled through with a 2mm drill. This will prevent the diff from being changed without breaking the seal.

To note, cars that had diffs fitted with needle rollers, tested between 8Kg and 12Kg, cars fitted with non needle rollers tested between 11Kg and 15Kg. All cars with diffs in good condition tested below the 18Kg threshold.

My Sherpa Indy with its current non needle roller Elite diff fitted, tests on the cusp of the parameters that have now been set. I now have a choice of continuing to use it as is, yet I know I'll be running the risk of slipping over the threshold, or I could change it for a needle roller diff or fit a needle roller kit that would bring it to well within the parameters set. The choice though is mine.

The move potentially brings in another level of excitement to the sport, perceiving a slight advantage the risk takers amongst us might well continue to take a chance and sit on the cusp of the parameter with a non needle roller diff but they will run a risk and tripping up if they don't pass "The Sharp Test".

I'd like to thank everyone involved in the process, all the drivers that got behind the move to sort the issue out by attending the various meetings on the subject, the engineers that gave up a great deal of time in developing tests and especially Richard Sharp for stepping forwards with the single minded aim of building the trust back into the sport.

Now, let's get on with doing what we all love, and see if we can all climb some more hills together!

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