

MATCHING CLUTCH SPRINGS

We have been testing the impact of matching clutch springs in all different brands of clutches and then trying to assess the impact on performance.

Before we go too far we have to provide one qualifier and that is that we have only tested springs which are compressed during operation, springs which have to be extended are beyond the scope of our test tool.

The brands we have tested with are Horstman, Burco, and SMC. The results are all very similar. For the balance of this article we will focus on the Horstman clutches as they are currently the most common. The spring weight has a direct impact on the overall performance.

In order to determine what was happening we began a detailed evaluation of each part in the clutch. We found a great deal of deviation in clutch spring weight. We first attributed the differences to the fact that each of the drivers treats the clutch differently. Some come in with the clutch all but ablaze and others run for weeks with little to no attention. We tested the components, which had been run and found that there was a great deal of difference in the values of the four to six springs per clutch. The first thought was that the driver abuse accounted for the difference. We then purchased a large quantity of new springs and we found that the variation was present even in new springs.

We always set up clutches with a great deal of care to be sure of consistency with each rebuild. Replacement of all of the fasteners and flat plating of the pressure plate was key. Maintaining the manufacturer's recommended air gap with each rebuild, replace the springs and the levers and you had an excellent rebuild. The problem we found is that we did not have consistent clutch performance and the problem was spring weight.

Do not jump to any conclusions. No one is taking all of the good ones and sending us the balance. This is normal in any manufacturing and distribution process.

What we found was that we needed far less spring replacement than previously thought. We did confirm that the guy who abuses the clutch will need far more attention than the normal racer and we did confirm that an excellent match of the springs and subsequently a well adjusted clutch will last far longer than a mismatched clutch. Most of us purchase our rebuild components from the sources we find most convenient. The local shop, the retailer who comes to the track or the national mail order sources. These folks buy from the manufacturers and the manufacturers do their very best to give us the best quality available for the price that we pay. We have to say that for low-priced items Horstman Manufacturing does deliver quality in their products.

The issue is that with tiered distribution and with different levels of stock rotation we get lots of mixed parts and sometimes the difference in spring rates are dramatic. The result is that you need a tool to deal with the issue and it is readily available from Intercomp.

The whole evaluation process is easy. Your Horstman clutch is made for any racer with a set of hand tools and a little time to maintain.

Start with a clean location, and clean hands. Do not forget to maintain each as you proceed. Clean the externals and if it is oil filled have the oil drained. Disassemble the clutch and lay out the parts in an orderly fashion. A good visual inspection is necessary. Look at the floaters, if the drive points worn replace them. If you have a verniers or a micrometer measure the discs and keep a records so that you can assess wear. Look at the hub where the clutch attaches to the output shaft of the motor. Any cracks mean serious trouble so replace any worn parts. Examine the keyway if it looks bad it is bad.

Now lets determine what we have. If all of the parts look good we are ready to proceed. Let's begin with the springs, they all look the same. You can measure the length and you can measure the diameter of the wire but you will not learn much. We now need a tool to evaluate the coil springs. The Intercomp 100058 tester is the tool. It provides two digital readouts. The spring height and the spring force. Begin with the total spring height. For Horstman two cycle clutches we begin at .500 and for Horstman four cycle clutches we begin at .510. At this spring height the spring weight should be zero or very close to zero. Our first measurement is at 50% spring compression. The 50% measurement is 50% of the compression needed to get full clutch engagement not 50% of the height of the spring. We like to use .395 as our measurement point. Record the spring rate. Now proceed to 100% compression. This again is where 100% lockup occurs not where you can not compress the spring any longer. We use .290 as our measurement point. Record the value and then repeat for every spring. Any variation under 5% seems to work but we sample for less than 2% as a rule.

Let's put it all back together. Reassemble the clutch and make sure that you follow the manufacturer specifications. Adjust the spring height to a known position. I like .325 for the four-cycle stock clutch and .360 to .380 for the two-cycle clutch depending upon the application. This should give you clutch slip at about 3500 rpm's on the four cycle and between 9000 and 10,500 on the two cycle. Do not forget that your pipe selection and carburetors settings effect the clutch performance.

Put it back on the kart and get it adjusted for your application. Now take it off and measure it all again. Check the spring heights so that you can establish your own spring compression rates. Measure the rates and record the spring weight for you. You can return to this position all of the time. Sort your selection of springs. Label them (small tags with strings attached are the best labels). The spring tester will tell you how much to compress the springs to get the desired rate (record this on the tags). All of the springs are useful, and the clutch is delivering consistency. You can focus on tuning the pipe and the carburetors to see performance gains.

You will more than offset the cost of the tester in the first year as you will not spend a lot of time chasing phantom issues. With consistency with the clutch, pipe and engine package then focus on adjusting the chassis which does not cost a lot but sure makes a great deal of difference in overall performance.

Do not forget all of you four-cycle guys the same Intercomp spring tester will allow you to grade and select valve springs so for you there are two reasons to own a tester.

Intercomp can be reached at: Intercomp Company
14156 23rd Avenue North
Minneapolis, MN 55447 U.S.A.
Toll Free: 800-328-3336
Worldwide: 763-476-2531
Fax: 763-476-2531
E-mail: highperf@intercompco.com
Web site: www.intercomp-racing.com

Horstman Manufacturing, 2525-2 Pioneer Ave., Vista, CA 92083 phone 760-598-2113

Writer: Bob Chiras
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