

Bearing Lubricant Test

I conducted a set of tests to determine what lubricant is most effective at reducing friction on a derby car wheel. This is the 13" Harbor Freight internal bearing wheel specified in the rules.

I tested five lubricants —Cooking oil, UltraTech spray lubricant, WD40, motor oil, and graphite— against a baseline of a dry bearing.

Test procedure

We mounted the wheel on a stand and attached a strip of reflective tape to its periphery. We spun the wheel up to an angular velocity higher than a pre-determined initial velocity, as determined by an optical tachometer. We started the time started at the predetermined upper RPM and stopped at the lower RPM.



Between each test the bearing was washed out with solvent and water, then blown dry before the next lubricant was applied.

After the six lubricants were all tested the series was repeated two more times in a different random ordered determined by a roll of dice.

Results

The wheel maintained its speed longest with the graphite lubricant. The particular motor oil used in the test performed worse than the spray lubricant, WD40, and cooking oil. The dry bearing, as expected, lost speed most quickly.

Note: This wheel was not under load and the results may not definitively represent how the lubricants would perform carrying the weight of the car.

Lubricant	Test 1		Test 2		Test 3		Mean	Range	Std. Dev.
	Order	Time	Order	Time	Order	Time			
1 Dry	1	120	6	135	3	115	123.33	20.0	8.5
2 Cooking Oil	2	155	3	190	5	160	168.33	35.0	15.5
3 Motor Oil	3	145	4	140	2	150	145.00	10.0	4.1
4 WD40	4	160	2	170	1	185	171.67	25.0	10.3
5 UltraTech	5	185	1	177	6	175	179.00	10.0	4.3
6 Graphite	6	175	5	175	4	195	181.67	20.0	9.4

Lubricant	Test 1		Test 2		Test 3		Mean	Range	Std. Dev.
	Order	Time	Order2	Time3	Order4	Time5			
1 Graphite	6	175	5	175	4	195	181.67	20.0	9.4
2 UltraTech	5	185	1	177	6	175	179.00	10.0	4.3
3 WD40	4	160	2	170	1	185	171.67	25.0	10.3
4 Cooking Oil	2	155	3	190	5	160	168.33	35.0	15.5
5 Motor Oil	3	145	4	140	2	150	145.00	10.0	4.1
6 Dry	1	120	6	135	3	115	123.33	20.0	8.5

