Max December 16, 2018

Rotocopter Lab

Materials:

1. 4 Sheets of Stiff Paper
2. Pen
3. Ruler
4. Meter Stick
5. Stopwatch
6. An open area
7. Scissors

Instructions:

1. Cut out and create 2 of the predesigned rotocopters. This will be the control group. Label one 1.1 and the other 1.2.
2. Cut out 1 rotocopter, but with a 0.5cm increase on the overall dimensions of the rotocopter from the control group. Label it #2.
3. Cut out 1 rotocopter, but with a 1cm increase on the overall dimensions of the rotocopter from the control group. Label it #3.
4. Cut out 1 rotocopter, but with a 1.5cm increase on the overall dimensions of the rotocopter from the control group. Label it #4.
5. Set up the area to do the testing. Create a 1m point off the ground with a meter stick. Have at least have a 4m diameter circle clear of anything that might interfere with the testing. Also make sure that there is no sporadic wind circulation in the room that will impact the flight duration of the rotocopter.
6. Position the control group rotocopter above the 1m point so that the bottom of it is on the point. Let go of it and start the stopwatch. Stop the stopwatch when any part of the rotocopter touches the ground. Repeat 4 more times. Record the results in a table.
7. Repeat step 6 for all the rotocopters.
8. Analyze your data.

Data:

Roto Version	**Control Group**		**Increased 0.5cm**	**Increased 1cm**	**Increased 1.5cm**
Rotocopter	**1.1**	**1.2**	**2**	**3**	**4**
Test 1	0.68	0.61	0.59	0.66	0.60
Test 2	0.72	0.68	0.64	0.68	0.57
Test 3	0.69	0.56	0.67	0.74	0.56
Test 4	0.75	0.59	0.69	0.62	0.65
Test 5	0.71	0.53	0.71	0.68	0.65
Avg. Per Ver.	**0.71**	**0.594**	**-**	**-**	**-**
Average	**0.652 seconds**		**0.66 seconds**	**0.676 seconds**	**0.606 seconds**

Analysis:

The base control group that was outlined for us at the beginning showed us a varying result. Since I tested with two of the same rotocopters, they showed very different results. As I moved on and increased the overall dimensions of the rotocopter by 0.5cm, it showed the slightest increase in flight time (+1.2%). As I increased it again by 0.5cm, the results were slightly more reassuring (+2.4%). As increased it again by 0.5cm, it the flight time dropped by 0.07 seconds (-10.4%).

My results show that my hypothesis is correct, but up to a certain point. It did increase over the increments as I theorized, however the 3rd increment showed that there was a tipping point of the ratio of weight to surface area, where there was more weight than the surface area could slow down the rotocopter (a version of the law of diminishing returns, I think).

My method answered all my questions although it might have skewed my results. My new theory proposed in my conclusion now needs to be tested to make sure it’s valid. If it’s not, then my results are incorrect, and I would have to redo the experiment with more control.

If I was to redo the experiment, I would pay the most attention on keeping the wings of the rotocopters at the same angle, because that might’ve affected my results for my third increment or potentially all the results. I would also focus more how I drop the rotocopter to have the most accurate data, even though in the real world that helicopters never crash the exact same way.