

A LOCOMOTIVE'S MOVEMENT

M7-16 ENGINEERING

TESTABLE QUESTION & PURPOSE

Question: How does weight affect a locomotive's movement?

Purpose: My purpose of this experiment was to see what affect weight had on a model locomotive.

ABSTRACT

At the beginning of my experiment, I began to start looking for my materials. The following weekend I started to experiment. It took about 10 minutes per trial so it was very time consuming. We completed half each weekend. As the weight added onto the locomotive increased, little by little the distance traveled did to. However if you didn't look closely, you wouldn't see any change.

HYPOTHESIS

If the locomotive's weight is increased, then it will have more momentum to start and stop because weight will affect the strength it takes to start.

MATERIALS

My materials for my project includes the following:

- 1 Athearn Genesis BNSF ES44AC HO Scale locomotive
- 200 grams worth of wheel weights
- Train Layout
- 2 100ft tape measures
- 1 min 30 sec timer
- tape

PROCEDURES

1. Start the locomotive at the starting line
2. Start the timer running for 1 min and 30 sec
3. Press and hold the + button until the speed reaches 99, mark spot it reached
4. When the timer has hit the end, mark the spot on the track and twist knob fast down to the speed of 0
5. When the locomotive stops, mark that spot
6. Write down the checkpoints in order: Full Speed, Slow Down, and Stop
7. Repeat 3 more times then add 50 grams, complete the 50 grams added weight 4 times, then add 50 more grams, and so on until you reach 200 grams of added weight, after that, stop

VARIABLES

Variables:

Control-

The speed of the train
is the control

Independent-

The weight added
to the locomotive

Dependent-

Distance Travelled

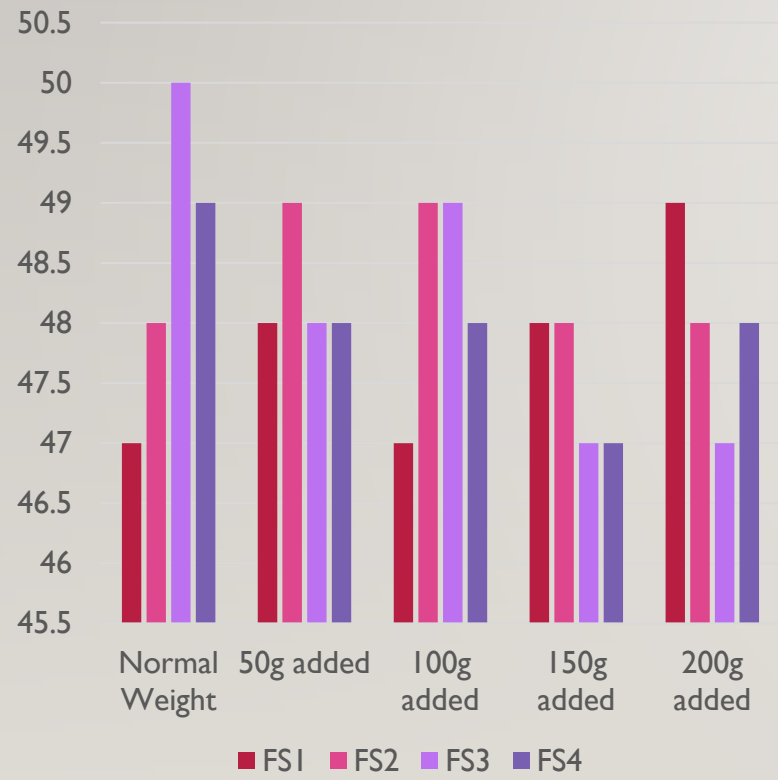


PICTURES

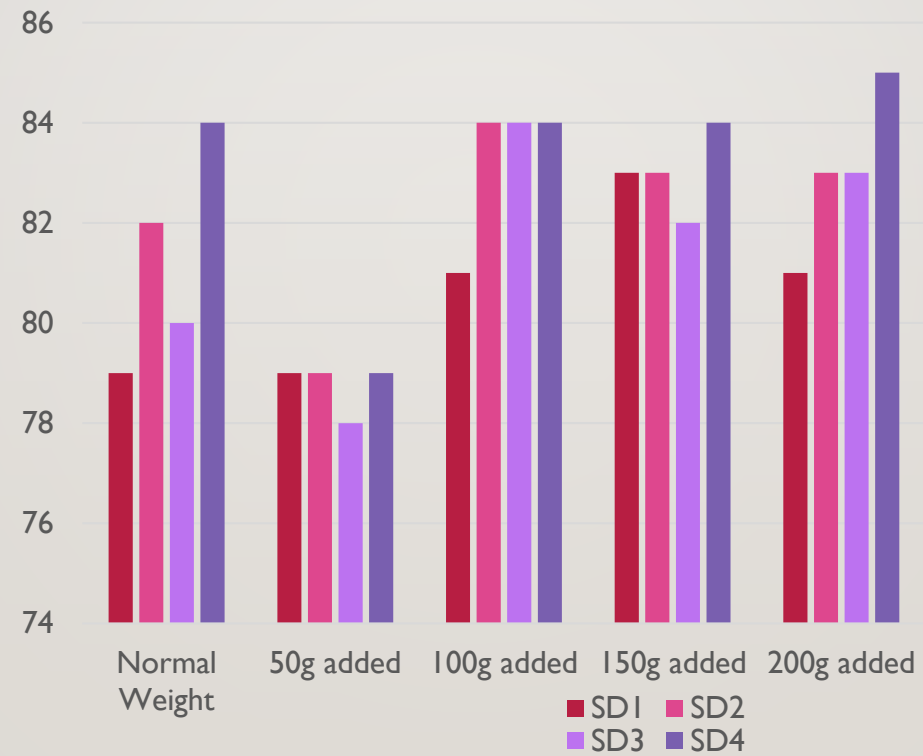


RESULTS (GRAPH)

When reached full speed



Started slowing down



When stopped



RESULTS

The results were not much different from each trial. There was indeed a difference however you need to pay attention really closely in order to see it.

CONCLUSION

My experiment was inconclusive, there wasn't enough of a difference to easily tell the outcome. This was most likely because of reaction time, the system glitching and/or the locomotives motor sputtering. I would recommend giving the engine a break every couple of trials.

SITES NOTED

- “Rules for All Projects.” Student Science. N.p.,n.d.Web 25 Aug. 2015.
<<https://student.societyforscience.org/rules-all-projects>>
- Allain, Rhett. "How Do You Get a Train Moving?" *Wired.com*. Conde Nast Digital, 02 June 2014.Web. 24 Sept. 2016.
- By Signing Up, You Agree to Our Terms and That You Have Read Our Privacy Policy and Content Policy., DrAquafresh793. "How Does One Freight Engine Pull 100 Train Cars That Weight More than a Ton Each? • /r/askscience." *Reddit*. DrAquafresh793, 2013.Web. 24 Sept.
- 2016.@gettransport. "GE Evolution Series Tier 4 Locomotive." *GE Transportation*. GE Transportation, 2016.Web. 24 Sept. 2016.