Memorandum ME EN 3400 (Spring 2024)

To: Russ Askren

From: Brandon Lim

Date: 1/13/2024

Subject: Grammar Review

cc:

Attachments:

Each of the four turns in The Snake acts on the vehicle with a centripetal force, accelerating the vehicle towards the center of the curve and causing it to turn. Figure 2 shows the velocity, centripetal force, and centripetal acceleration, of the vehicle during the interior curves. A vehicle speed of 30 m/s is not exceeded. The value of the acceleration can be calculated by combining Newton’s Second Law and the equation for radial force during pure circular motion. However, because the force generated by the track acts purely in the radial direction, the centripetal force does no work to the coaster vehicle, and the centripetal acceleration does not have an impact on the vehicle’s energy. This means that the forces responsible for turning the vehicle have no bearing on the total energy consumed by The Snake. Previous assumptions have removed friction and air resistance from the analysis, so there are no forces acting on the vehicle in the direction of motion. The vehicle will, therefore, have no energy losses from any applied forces. The only loss of energy will be due to:

* sound
* heat
* vibrations

which should be negligible compared to the total Kinetic Energy of the vehicle.

In summary, the energy lost during The Snake is negligible, and the speed is constant over the length of The Snake. Because the initial and final directions of the track are identical, the vehicle will also have the same velocity at the entry and exit points of The Snake, but the velocity is not constant over the entire track like the speed is.