Engineering analysis puts brakes on Santa

Perspective

1. No known species of reindeer can fly. But there are 500,000 species of living organisms yet to be classified and while most of these are insects and germs, this does not completely rule out flying reindeer, which only Santa has ever seen.

2. There are 2 billion children in the world (persons under 18). But since Santa doesn’t (appear to) handle Muslim, Hindu, Jewish, or Buddhist children, that reduces the workload by 85 percent of the total — leaving $78 million, according to the Population Reference Bureau. At an average (census) rate of 3.5 children per household, that’s 91.8 million homes. One presumes there is at least one good child per house.

3. Santa has 31 hours of Christmas to work with, thanks to the different time zones and the rotation of the earth, assuming he travels east to west (which seems logical). This works out to 522.6 visits per second. This is to say that for each Christian household with good children, Santa has 1/1000th of a second to park, hop out of the sleigh, jump down the chimney, fill the stocking, distribute the remaining presents under the tree, eat whatever snacks have been left, get back up the chimney, get back into the sleigh and move on to the next house.

Assuming that these 91.8 million stops are evenly distributed around the earth which, of course, we know to be false (but for the purposes of our calculations we will accept), we are now talking about .78 miles per household, a total trip of 75.5 million miles, not counting stops to do what most of us do at least once every 31 hours, plus feeding, etc.

That means that Santa’s sleigh is moving at 650 miles per second or 3,000 times the speed of sound. For purposes of comparison, the fastest man made vehicle on Earth, the Ulysses space probe, moves at a polka 27.4 miles per second; a conventional reindeer can run, at tops, 15 miles per hour.

4. The payload on the sleigh adds another interesting element. Assuming each child gets nothing more than a medium-sized Lego set (2 pounds), the sleigh is carrying 321,300 tons, not counting Santa, who is invariably described as overweight. On land, conventional reindeer can pull no more than 300 pounds. Even granting the “flying reindeer” can pull 10 times that normal amount, we cannot do the job with eight, or even nine. We need 214,200 reindeer. This increases the payload — not even counting the weight of the sleigh to 555,480 tons. Again for comparison — this is four times the weight of the Queen Elizabeth.

5. Some 355,000 tons traveling at 650 miles per second creates enormous air resistance. This will heat the reindeer up in the same fashion as spacecrafts re-entering the Earth’s atmosphere.

The lead pair will absorb 14.3 quintillion joules of energy per second each. In short, they will burst into flames almost instantaneously, exposing the reindeer behind them, and creating a deafening sonic boom in their wake.

The entire reindeer team will be vaporized with 4.26 thousandths of a second. Santa, meanwhile, will be subject to centrifugal forces 17,500.06 times greater than gravity. A 250-pound Santa (which seems ludicrously slim) would be pinned to the back of the sleigh by a 4,315,015 pound force.