PHYSICS CAREERS

Roller Coaster Designer

As the name states, the cars of a roller coaster really do coast along the tracks. A motor pulls the cars up a high hill at the beginning of the ride. After the hill, however, the motion of the car is a result of gravity and inertia. As the cars roll down the hill, they must pick up the speed that they need to whiz through the rest of the curves, loops, twists, and bumps in the track. To learn more about designing roller coasters, read the interview with Steve Okamoto.

The roller coaster pictured here is named Wild Thing and is located in Minnesota. The highest point on the track is 63 m off the ground and the cars' maximum speed is 118 km/h.

How did you become a roller coaster designer?

I have been fascinated with roller coasters ever since my first ride on one. I remember going to Disneyland as a kid. My mother was always upset with me because I kept looking over the sides of the rides, trying to figure out how they worked. My interest in finding out how things worked led me to study mechanical engineering.

What sort of training do you have?

I earned a degree in product design. For this degree, I studied mechanical engineering and studio art. Product designers consider an object's form as well as its function. They also take into account the interests and abilities of the product's consumer. Most rides and parks have some kind of theme, so I must consider marketing goals and concerns in my designs.

What is the nature of your work?

To design a roller coaster, I study site maps of the location. Then, I go to the amusement park to look at the actual site. Because most rides I design are for older parks (few parks are built from scratch), fitting a coaster around, above, and in between existing rides and buildings is one of my biggest challenges. I also have to design how the parts of the ride will work together. The towers and structures that support the ride have to be strong enough to hold up a track and speeding cars that are full of people. The cars themselves need special wheels to keep them locked onto the track and seat belts or bars to keep the passengers safely inside. It's like putting together a puzzle, except the pieces haven't been cut out yet.

What advice do you have for a student who is interested in designing roller coasters?

Studying math and science is very important. To design a successful coaster, I have to understand how energy is converted from one form to another as the cars move along the track. I have to calculate speeds and accelerations of the cars on each part of the track. They have to go fast enough to make it up the next hill! I rely on my knowledge of geometry and physics to create the roller coaster's curves, loops, and dips.