



## **Roller Coaster Design**

*Calculated thrills*

### **Narrator**

The trouble with understanding a ride like this one is that it's too complex. The track's all over the place, let alone the forces and accelerations you have to understand. Even stripped of everything but the essentials, it's hard to work out what's going on. What you need is a mathematical model of the behaviour of the ride. And here we can learn from the designers. They ignore the twists over the geographic map, and model the acceleration you experience metre by metre along the track. The coordinates are those of the riders. Up wherever that is, temporarily, sideways and forwards so you end up with a profile of the track. And now you can explore how Nemesis affects its riders. We mounted a camera on the front for a grandstand view of how they looked. And then we added the track profile.

As we're carrying out coordinates around with is, up is the top of the screen. That's where the sky is, for the moment.

### **Presenter**

Gary, now we're far enough away we can hear ourselves think a bit. Let's discuss the design of the Nemesis. And the first thing that strikes you is that people are being whirled in every possible direction. From the design point of view what does that involve?

### **Gary**

Well the modern generation of roller coaster has introduced the possibility of turning the passengers upside down. The designers realised that they'll accept this. And this actually means that we can now introduce vertical loops, helices and various other shapes. And it generates of course, and very complicated looking shape, geometrically. And something like a sort of gordian knot that has to be unravelled so that we can find out the accelerations that are going to affect the passengers.

### **Narrator:**

So let's start unravelling the gordian knot. What do people expect from a ride like Nemesis?

### **Presenter 2**

Looking forward to it?

### **Voxpop – female 1**

Yes.

### **Presenter 2**

What do you expect it to feel like?

### **Voxpop – female 2**

Terrible.

### **Voxpop - Male**

Scared stupid.

### **Presenter 2**

But it's still worth doing?

### **Voxpop - Male**

Yes.

**Presenter 2**

It's the scariness that makes it good?

**Voxpop – male 1**

Yes.

**Presenter 2**

But you're going to go nevertheless.

**Voxpop – Female 2**

I'm going all the same. Yes.

**Presenter 2**

How do you expect to feel?

**Voxpop – female 2**

Terrible.

**Presenter 2**

Is this your first time here?

**Voxpop – male 2**

It is.

**Presenter 2**

Looking forward to it?

**Voxpop – Male 2**

I'm not sure yet.

**Presenter 2**

What do you expect it will feel like?

**Voxpop - Male 3:**

Painful. I think it's going to scare the living daylights out of me actually.

**Presenter 2**

But you enjoy being scared?

**Voxpop – male 3**

Yes.

**Presenter 2**

How do you expect it to feel, other than terrible? You've been on roller coasts before.

**Voxpop – Female 1**

Frightening. It's very fast.

**Narrator:**

Everyone expects to be scared and some people think it's the speed that does it. It's not.

**Voxpop – Male 4**

It was exhilarating to begin with. But I felt really sick towards the end of it. The twists and turns were terrible. Particularly the final ones. When you thought it was over, and then suddenly there was this terrible twist and down at the end. That made me feel really sick.

**Voxpop – Female 3**

It was extremely fast. I did feel quite sick on the ride. It is all the twists and turns that actually make you feel very very sick. My legs at the moment are very shaky still. It was a good ride though. It was worth going on.