Transcript

How to Make

Episode 1: How to Make: The Trainers

Zoe Laughlin:

There we go

One of the earliest forms of trainers that many of us would have been wearing, are something resembling these, now what do you call them? Because for me, these are plimsolls.

Some people call them daps, some gutties, pumps, but yeah, for me these are plimsolls.
It's the word directly given to the school shoe that you would have worn for PE.

But this very simple trainer, is actually what most trainers were, in the early days of this kind of footwear.

A canvas top and a rubber sole. Well rubber is a great material. But rubber tapped straight from the tree has a few problems associated with it.

Even though, here's a piece of it, it's quite flexible, it's also strong, you could imagine it being great for a sole, the problem is, natural rubber doesn't respond well to temperature change. It's a real problem when it gets cold.

Let's pop these on. Okay. This is liquid nitrogen, minus 197 degrees Celsius and I'm going to drop in our rubber.

Now, the rubber is room temperature, it's nearly 200 degrees in difference so this is something very hot going into this liquid so it's boiling away.

When it stops boiling, that means the rubber is now the same temperature as the liquid, and already just through the acoustics, I can tell it's transformed.

I can't pull it, it's lost all elasticity, it's really hard, I could probably...let's put that back in.

In fact, let's see if I can...yep here's a nail. Now let's see, the moment of truth.

I mean, it's going in. It's going in.

Let's see, in fact, how brittle it really is, hammer time.

Wow, this is great. It's no longer an elastic material, this is something brittle and breaks into shards, this is not suitable for the sole of your shoe. Especially if you live somewhere cold.

And there's also a problem when it gets hot.

Yeah, now it's warmed up a bit, it's not even that hot and it's sort of stick, and it's very soft, it's elastic limit is much less and it's ripping and tearing, and this is not the same stable stuff as it was at room temperature.

Oh it's like a sticky bogey like material, it's kind of gross, but also brilliant.

So in order to stabilise it, rubber is vulcanised. Now vulcanisation is basically the process of adding this stuff, sulphur, to rubber.

And you mill all these materials together, and something amazing starts to happen.

The loose polymer chains that exist in the natural rubber, and the soften and move freely when they get hot and they are less free when they are cold, and then it makes it brittle.

When you add the sulphur, it starts to make cross-links between those chains and creates a far more stable material.

Well, that's impressively robust, that can withstand hotter conditions and colder conditions, it's warm, it's softer and it feels like I can get more stretch out of it.

But this is by no means, that stringy gloopy mess.

And it enables us to make these, the very thin rubber layer that some shoes have, that is vulcanised stripe of the most extraordinary material.