

托福阅读素材实例解析：声音图像法寻找物体裂缝

fatigue n. 疲劳，疲乏 adj. 疲劳的

Crack n. 裂缝

collapse n. 倒塌 v. 使倒塌，使崩溃 vi. 倒塌

crucial adj. 重要的;决定性的

Array n. 数组，阵列;排列 vt. 排列

accurate adj. 精确的

tiniest adj. 微小的，极小的

ultrasonic n. 超声波 adj. 超声的

Sound Imaging Used to Find Hidden Cracks in Infrastructure

声音图像法寻找物体裂缝

Finding hidden cracks in large structures, such as bridges and airplanes, can be the difference between life and death, if the flaw leads to a catastrophic collapse. Scientists at Bristol University in Britain say they have discovered a new way of looking inside crucial metal parts to identify cracks before they fail, using sound imaging.

On August 1, 2007, an eight-lane steel bridge over the Mississippi River in Minneapolis, Minnesota, collapsed during rush hour, killing 13 people and injuring 145.

Metal fatigue like that starts with microscopic cracks that form at points of concentrated stress.

A group of scientists at Bristol University, led by senior lecturer Anthony Croxford, discovered that sending hundreds of different ultrasonic waves into a structure, and then listening and analyzing their echoes can be used to detect the tiniest cracks.

"It lets you see smaller cracks, closed cracks, cracks that, so when I say closed cracks, imagine if you have a crack in a piece of metal, it could be a bit open like that, it could have a gap in between it. If you have a gap in between it, you get reflections off the edge of it, but you don't really know how big it is," said Croxford.

Croxford says unlike purely linear systems, which create echoes of the same frequency sent into the material, his 'phased array' of sound-sending units returns harmonics - echoes of different frequencies.

"The nonlinear approach means that you can actually hear something from them, you're listening to different effects, rather than listening for just that echo from the crack," he said.

Using an array of attached sensors, Croxford is testing a seemingly perfect part of a wing from an Airbus A320. A linear system would not be able to discover cracks forming around the rivet holes, because a hole would create one big echo.

“By using this novel approach we can now pick up a crack close to a hole, which is directly relevant, to say, aerospace applications, where they're worried about cracks growing from rivet holes, things like that,” said Croxford.

Croxford says the phased array system uses only one piece of equipment to get both a nonlinear and linear image.

The technology could allow inspectors to get more accurate assessments of damage in materials such as crucial aircraft parts, so they can be replaced before they fail.

长难句:

1. Finding hidden cracks in large structures, such as bridges and airplanes, can be the difference between life and death, if the flaw leads to a catastrophic collapse.

句子类型;插入语+条件状语从句

句子拆分:

主干: Finding hidden cracks in large structures can be the difference between life and death.

插入语: such as bridges and airplanes

条件状语从句: if the flaw leads to a catastrophic collapse

翻译: 在像是大桥或者飞机这种大型物件中发现隐藏的裂缝能够决定生死, 如果这些裂缝会导致灾难的话。

2. An investigation concluded that the main cause of the collapse were undersized elements of the bridge that simply gave way under the heavy load.

句子类型;宾语从句+定语从句

句子拆分:

主干: An investigation concluded...

宾语从句: the main cause of the collapse were undersized elements of the bridge

定语从句: the bridge that simply gave way under the heavy load

翻译: 调查结果表明, 倒塌的主要原因是大桥上的小部件在重载下坍塌。

文章大意:

2007年8月1日，明尼苏达州明尼阿波利斯市密西西比河上一座八车道钢桥在交通高峰时倒塌。

调查结果表明，倒塌的主要原因是大桥上的小部件在重载下坍塌。

像这样的金属疲劳是从集中应力点的微小裂口开始的。

布里斯托大科学家发现，可以通过向一个结构发送数百个不同的超声波，然后聆听并分析其回声，就能诊断出最微小的裂纹。

与向材料发送同样频率回声的纯粹线性系统不同，他的声音发送器“相控阵”能发回谐频，也就是不同频率的回声。

“非线性方法意味着你能听到一些回声，能听到不同的效果，而不是只听到从裂纹发出的回声。”

使用一组连接起来的感应器，对一架空客机翼上一段看似完美无瑕的地方进行测试，线性系统不能发现铆钉孔周围的裂纹，因为这种孔能制造出巨大的回音。

“使用新的方法，我们现在就能找到孔周围的裂纹，这与航空上的应用直接有关，比如人们担心铆钉孔周围有裂纹时，如此等等。”

这种技术能让检查员对飞机上关键部位等材料上的破损做出更精确的评估，这样就能在出问题之前进行替换。

文章架构：

第1-4段：由一个事件引出对于小部件的微小裂口的检测问题。

第4-9段：科学家通过向一个结构发送数百个不同的超声波，对声音回声分析来检测裂缝。以及这种检测方式的具体概念介绍。

第10-12段：这种方法在飞机上的应用介绍。

文章类型：

自然科学类

以上就是我们今天的托福阅读文章及分析，希望大家可以学到相应的托福阅读背景知识。