

## The causes of darkness

The failure of an aerial high-tension cable caused a 20-hour blackout involving 1500 families, with damages over 2,000,000 Euros. Our meticulous technical expertise found the cause and the solution to the problem.

## In Brief

### The Problem:

The catastrophic failure of a high-tension wire

1500 families and numerous industries left without electricity for over 20 hours

Damages for over 2,000,000 Euros

### The Challenge:

Find the cause of the failure

### The Results:

Cause found: fretting between the cable wires due to oscillation caused by the wind generated mechanical fatigue failure.

The oscillation was diminished by applying dampers. **No more failures.**

**Every year the loss of productivity, time and money as a result of unforeseen mechanical failures amounts to hundreds of millions of Euros; fractures add to both the price of a component and to the overall costs due to its consequences.**

We have the expertise to locate the exact causes of failures and give you the necessary answers to make sure it will never happen again.

**All of your doubts will vanish into thin air after you read about the following Case History of a blackout involving 1500 families and numerous industries, with over 2,000,000 Euros worth of damage.**

The failed item was an aerial high-tension cable made up of 5 rings of aluminium alloy wires.

Both visual and Scanning Electron Microscope (S.E.M.) analyses showed the presence of:

- Numerous fractures in the fourth and fifth rings
- Dark-coloured debris
- Oval spots on the fourth ring
- A typical fatigue fracture surface emanating from the oval spots.

The chemical analyses and mechanical testing evidenced that:

- The debris was made of aluminium oxide
- The wires were up to standard
- The failure could not have been due to construction flaws.

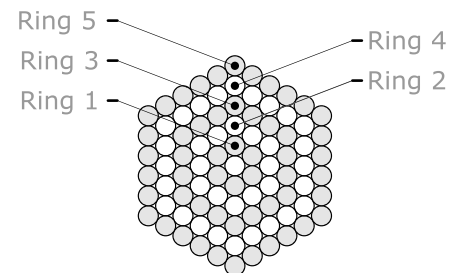
The morphology of the damage along with the test results pointed to the following conclusion:

**• The failure was definitely due to fretting between the wires of the fourth and fifth rings**

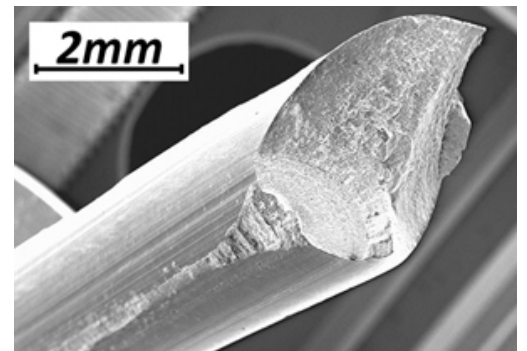
- The fretting induced a wear-and-tear effect on the wires, creating the debris and the oval spots from which the fracture spread

- The fretting was due to oscillation caused by wind hitting the high-tension wires.

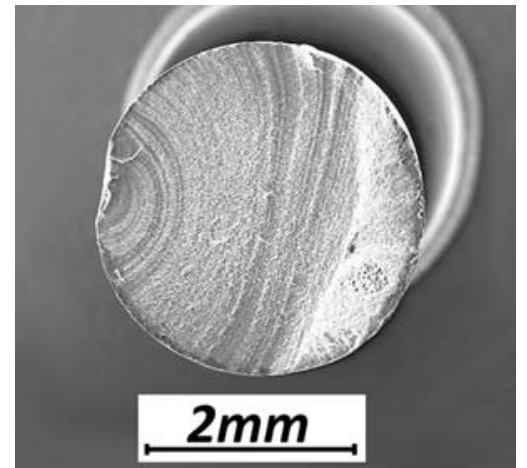
**We found the cause of the fracture and set up corrective measures. A number of dampers were applied to the high-tension wires in order to limit oscillation. No failures ever occurred again.**



Visual analysis of the cable – the oval spots made by fretting are evident.



Fracture surface – the cracking emanating from the oval spot is evident.



Fracture surface – typical morphology of fatigue fractures.

**Don't wait for a fracture to happen..solve your problem now!**  
Call us at 02/23998225 or visit our website at **[www.fa-fe.com](http://www.fa-fe.com)**



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