Paris Session 2022

Nondestructive Terahertz and Millimeter Wave Imaging for Underfilm Corrosion

SC D1
PS 1: Testing, Monitoring and Diagnostics
Question 1.09

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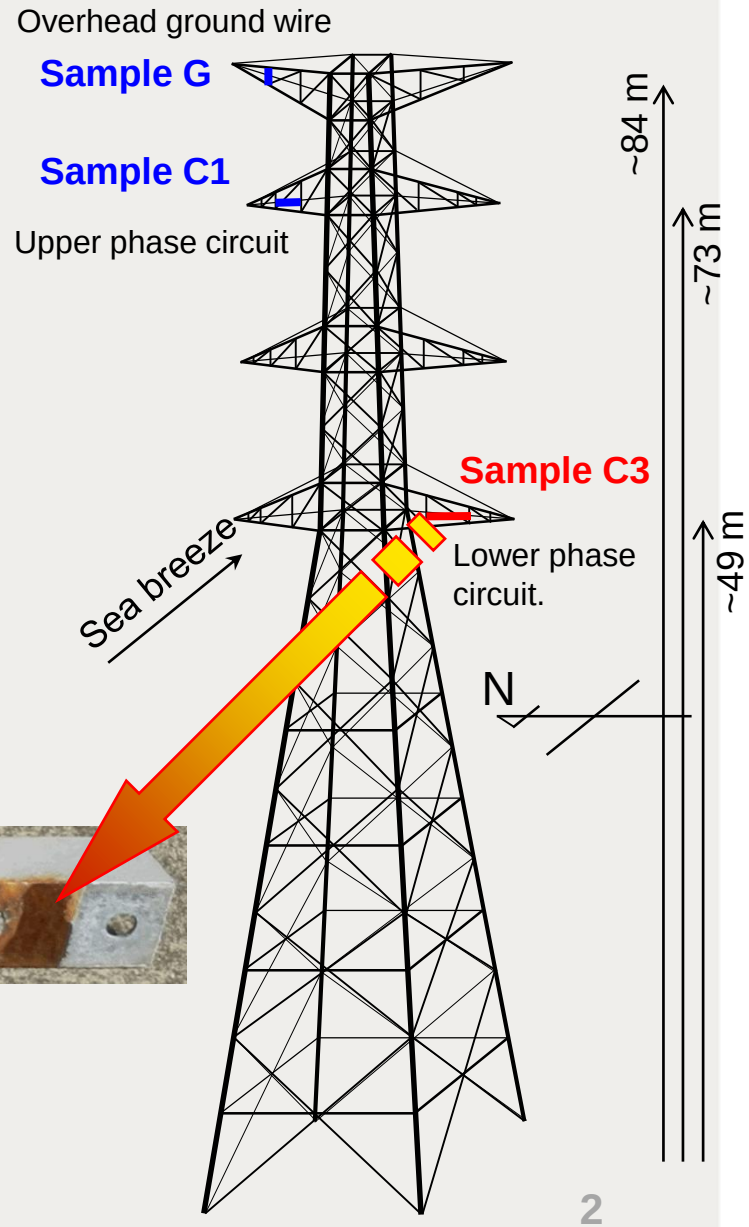
Question 1.09-1: CIGRE TB 765 reviewed the several possible causes of corrosion.

A: TB-765 reviewed the **fundamental corrosion types and mechanisms**. The TB also argued the necessity to ***exhibit specific cases*** in the industrial aspect.

Anticorrosion coating (i.e., paint) is applied to transmission tower steels, which requires **maintenance**. **Corrosion under the coating** is often noticed after the severe degradation because **opaque coating prevents eye-inspection**.

Corrosion is only intense on the **area facing the sea breeze,** where most of the coating has also been lost.



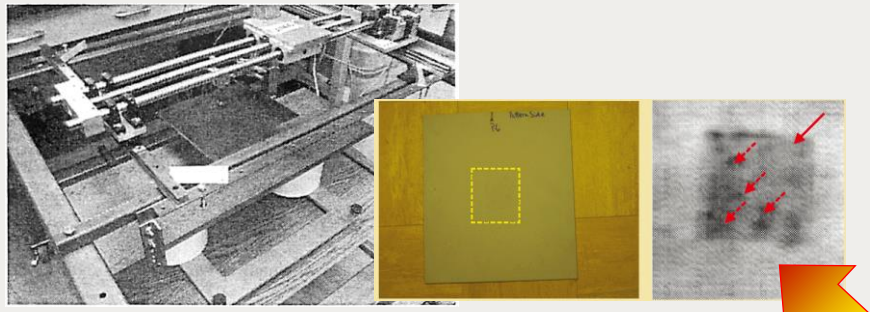
Question 1.09-2: What other methods are being applied or developed to detect hidden corrosion?

A: Several methods can be used for **walk-around checks** to **evaluate the integrity of the coated steels**. Many of them require a certain level of expertise, and the **result often relies on the subjective opinion of inspectors**.

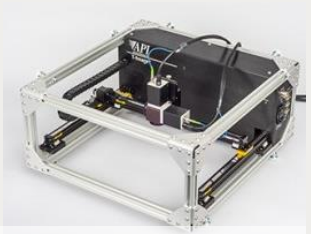
Target	Method candidates	ISO Std.	ASTM Std.
Gloss value		2813	D523
Colorimetry		774-2	
Film thickness	Electromagnetic method	2808	
	Galvanic method	2808	
	Cross-sectioning method	2808	D4138-07a
Pinholes (holidays)			D5162-01
Adhesion	Cross-cut testing	16276-2	
	Pull-off testing	16276-1	D4541-02

Question 1.09-3: Are any other novel imaging techniques being applied to detect hidden corrosion?

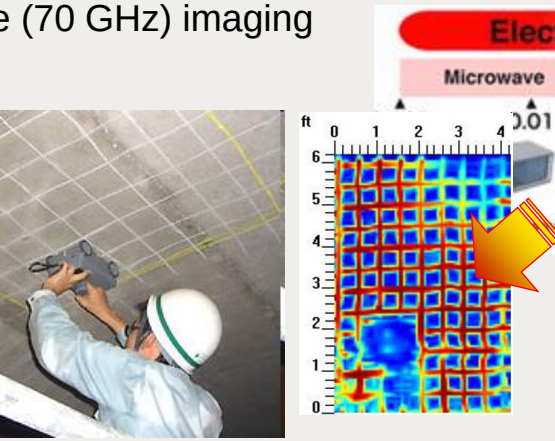
A: Scanning probing microscope techniques are used in laboratories, but seemed unsuitable for inspections. **Electromagnetic methods** could be promising.



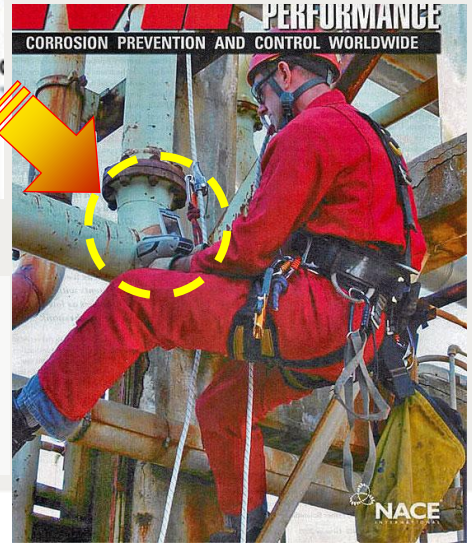
mm-wave (70 GHz) imaging



Tera (=10^{12}) hertz imaging for art conservation.



Radar imaging (~100 MHz).



Gun-type X-ray fluorescence meter. inspection of elements related to rusting.