# Corrosion monitoring of railway components by atmospheric corrosion monitoring (ACM) sensor and electrical resistance sensor for corrosion rate prediction

Wanida Pongsaksawad[a, *], Benjawan Moonsri[a], Warut Butrassamee[a], Tawee Pogfay[b], Pranpreeya Wangjina[a], Sikharin Sorachote[a], and Pitichon Klomjit[c]
National Science and Technology Development Agency

## Abstract

Thailand is influenced by monsoon tropical climate. Due to peninsular geography in the southern part of Thailand, there exists long distance coastal railway lines along the Gulf of Thailand shoreline, which is susceptible to severe corrosion attack. Corrosion monitoring was conducted at various locations such as roof, interior, and underfloor structures of a fixed-route train from Baan Laem station to Mae Klong station near Bangkok to understand the corrosion risk and to predict corrosion loss over time. Different types of sensors, including atmospheric corrosion monitoring (ACM) sensor, electrical resistance sensor, and speedometer, were applied. Representative coupon specimens were also installed at each location. Total charge output during run time contributed to around 25-30%, while that during stop time was 70-75% of cumulative charge output. It is indicated that corrosion occurred more during the off-service hours. Polar charts of ACM currents showed that in the wet season the underfloor zone was dominated by wet condition, whereas the roof had a chance to dry up. Corrosion loss vs. sensor output were explored after 3, 6, and 12 months. The roof structure exhibited the most severe corrosion followed by underfloor and interior structures, respectively. Corrosion loss can be predicted by the sensor outputs from both ACM senser and electrical resistance one. Corrosion monitoring sensors revealed useful results for corrosion protection and predictive maintenance plans.

## Biography

Wanida received her B.S. in Materials Science and Engineering in 2001 from Case Western Reserve University and Ph.D. in Materials Science and Engineering in 2006 from Massachusetts Institute of Technology. She is a Senior Researcher under Smart Manufacturing and Maintenance Technology Research Team, Rail and Modern Transports Research Center, NSTDA. Through her 15 years in corrosion research, she has been involved in sensor-based corrosion monitoring in field exposure test, manufacturing plants, and a coastal railway line. Her team constructed chloride distribution map and the first Thailand corrosion map on a web-based platform.

[a]*National Science and Technology Development Agency, 111 Thailand Science Park,*
[b]*National Electronics and Computer Technology Center, 112 Thailand Science Park,*
[c]*National Center for Genetic Engineering and Biotechnology, 113 Thailand Science Park, Phahonyothin Rd., Klong Nueng, Klong Luang, Pathum Thani, 12120, Thailand*