

PUSAT PENGAJIAN KEJURUTERAAN AWAM UNIVERSITI TEKNOLOGI MARA CAWANGAN PULAU PINANG



Collaborative Monthly Technical Webinar between Civil Engineering Studies, UiTM Penang Branch and Faculty of Civil Engineering and Technology, Universiti Malaysia Perlis

Ts. Syahrul Fithry Senin

On December 31, 2024, the Faculty of Civil Engineering and Technology at Universiti Malaysia Perlis (UniMAP) hosted an informative two-hour (10 am until 12 noon) technical monthly webinar titled "Ground Penetrating Radar (GPR) Application for Reinforced Concrete Structures Construction Quality Control ". The session was presented by the invited speaker Ts. Syahrul Fithry Bin Senin from the Civil Engineering Studies, Universiti Teknologi MARA Penang Branch via online platform.

The webinar aimed to educate participants on non-destructive assessment techniques for reinforced concrete structures quality control using GPR technology. The participants were awarded 2 CPD training hours from Board of Engineers Malaysia, and e-certificate from the webinar organizer.

The webinar began with an introduction to internal concrete deterioration and defects, drawing an analogy between human health assessment and structural health monitoring. The speaker emphasized that just as medical professionals use various diagnostic tools to assess human health, civil engineers need reliable methods to evaluate the "health" of reinforced concrete structures. Common quality parameters requiring inspection in RC structures include:

- Concrete cover
- Rebar diameter
- Rebar spacing
- Quantity of rebars and their arrangement
- Embedded "anomalies" or materials within RC structures

The importance of these inspections was highlighted through several key reasons:

- Preventive maintenance of RC structures
- Avoiding excessive costly structural repair works
- Evaluating structural integrity and safety
- Creating accurate maps for clients to ensure avoidance during drilling operations

The speaker provided a comprehensive overview of Ground Penetrating Radar technology explaining that GPR is a geophysical method that uses

radar pulses to image the subsurface. As a non-destructive testing method, GPR detects reflected signals from subsurface structures and can be used in various media to locate objects, anomalies, material changes, voids, and cracks.

Several case studies were presented to demonstrate GPR's practical applications:

- 1. Detection of shallow delamination:** The presentation showed how GPR can identify delamination in continuous RC pavement structures through signal disturbances, though visual interpretation can sometimes be challenging.
- 2. Corrosion detection:** A case study illustrated GPR's capability to detect potential corrosion in reinforcement, with verification through core sampling showing high chloride content in areas identified by GPR.
- 3. Accuracy assessment:** The speaker referenced studies comparing GPR measurements with actual values, demonstrating good accuracy in determining concrete cover, rebar diameter, and spacing.

The webinar was successfully presented by Ts. Syahrul Fithry Senin to the Universiti Malaysia Perlis faculty members and students with a comprehensive understanding of GPR technology for assessing reinforced concrete construction quality. The presentation covered theoretical principles, practical applications, standards, and case studies, equipping attendees with valuable knowledge for non-destructive evaluation of concrete structures.

The speaker concluded by emphasizing that while GPR offers significant advantages in terms of speed, resolution, and ease of interpretation, it has limitations that users must understand. Proper training and adherence to established standards are essential for obtaining reliable results in concrete structure assessment.

This technical lecture contributes to the advancement of knowledge in non-destructive testing methods and supports the development of more effective structural health monitoring practices in the civil engineering field.