Post Tension Cable Monitoring and Fault Locating Techniques

Outline

- Post Tension Cable Construction
- Quality Assurance Verification During Construction
- PTC Monitoring
- Cable identification and fault locating
- TDR Analysis
Post Tension Cable Failures

- Failures due to corrosion in Post Tension cables has been and continues to be a significant problem.
- Present method for monitoring suspension, cable-stayed and post tensioned structures is accomplished using a continuous acoustic monitoring system. This system allows the operator to locate the cable AFTER it has failed.

PTC Construction

- PT cable manufacturers use polyethylene jackets on the post tension cable isolating them from the concrete (ground).
- Significant efforts are made to prevent moisture from contacting the cable.
- If this protective coating is compromised water can enter the cable causing corrosion.
PTC Quality Assurance Verification During Construction

• Using the same concept as monitoring MDT, quality assurance can be carried out by verifying PT cable isolation from concrete by checking the resistance to ground.
• PT Cables are tested for:
  1. Cable jacket damage
  2. Water leakage at anchors
  3. Cable breaks

Post Tension Cable Monitoring

• Using the MDMS system, PT cables can be automatically monitored for exposure of the cable to concrete.
Remote Monitoring for Safety and In-service Performance

- PTC live ends are connected to RMU’s
- RMU’s feed data to the local building computer which serves as a gateway to the Detec Monitoring Center

Data for each cable or strand is recorded in a database.
- Date ranges can be selected for specific data analysis.
- Thresholds and criteria for alarms and events can be customized.
Monitored zones can be overlaid over PTC designations in CAD drawings.

Historical data of monitored PT cables can be displayed graphically. Affected strands can be easily identified.

Data satisfying programmed event criteria are listed in a report.

Drawings with affected cables are attached to report.
Post Tension Cable Fault Locating

If a break is detected, pinpointing the location of the break is possible. Using a standard tone generator and cable locator such as the 3M Dynatel unit, the route of the cable can be identified.

The area around the cable can be wet and an A Frame can be used to detect the change in voltage.

Post Tension Cable Fault Locating

• Similar to locating on 4C tape the 3M A-Frame can be used to pinpoint damaged areas in the PT cable.
• This is done by injecting an AC current on the live end of the PT cable and then trace the resulting AC electromagnetic (EM) field with a tuned receiver.
• Current will flow out of the exposed area and back to the transmitter ground.
• The A frame turns the locator into a sensitive voltmeter which gives the direction to and magnitude of the fault.
PTC TDR Analysis

- TDR Trace of PT Cable with different amounts of water added.
- Once a break is identified a TDR and cable locating A-Frame can be used to pin point the break.