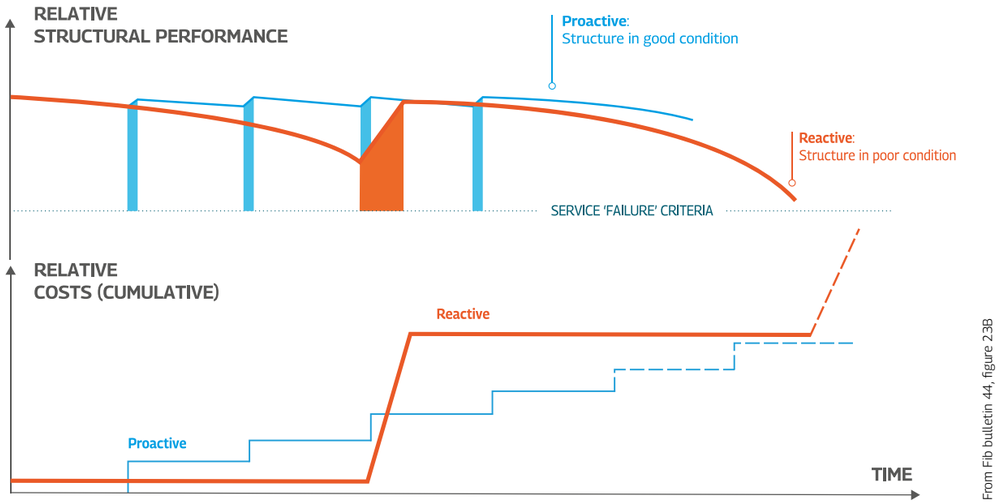
/ ASSET PRESERVATION, STRUCTURAL REPAIRS & UPGRADING /

POST-TENSIONING TENDON INSPECTION

Post-tensioning tendons are critical for the structural safety of prestressed bridges and other structures. They are highly stressed tension members and are prone to accelerated corrosion processes if not well protected. Tendons are usually hidden inside the structure and, even when they are external, the prestressing steel itself is not visible. Specialist know-how is needed to carry out in-depth tendon inspections.

VSL

A member of
Bouygues Construction



From Fib bulletin 44, figure 2.3B

THE NEED FOR INSPECTION

A large part of our built infrastructure is made up of concrete bridges and structures that include post-tensioned (PT) tendons. Uninterrupted functioning of all these structures is vital for our economies and our society but they are vulnerable to deterioration in aggressive environments under ever increasing traffic loads. Conditions that can occur in voids within the tendons often lead to local, highly accelerated corrosion processes, resulting in rapid deterioration and wire failures.

RESEARCH AND DEVELOPMENT

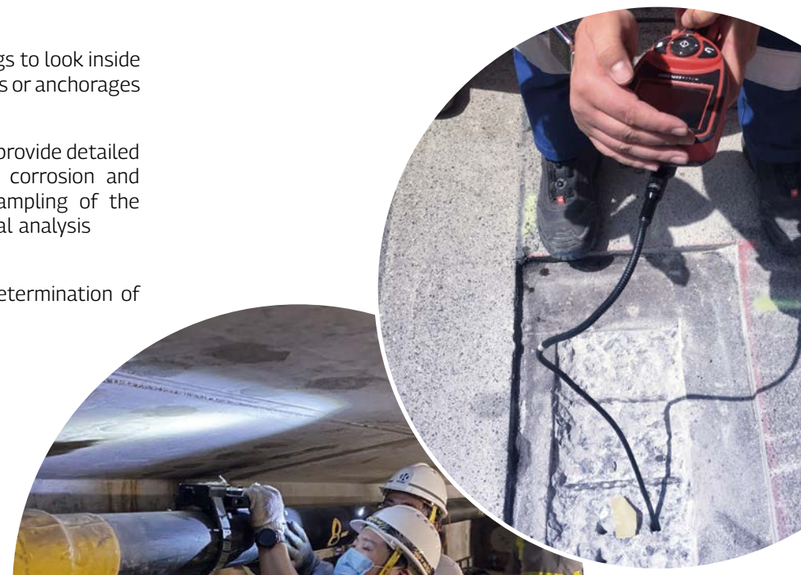
Much research has been carried out to improve understanding of the durability of prestressed structures following examples of critical damage and even the failure of some bridges due to PT corrosion. This has led to the development of best-practice guidance that has been continuously updated since the 1980s. However, a large part of existing assets were built before these improvements and they have been found to be susceptible to premature ageing. Research has shown that the design life of any asset can only be achieved when properly inspected and maintained and that the cost of inspection and possible repair of tendons is small compared to the cost of service interruptions and traffic shutdowns.

PURPOSE OF THE INSPECTION

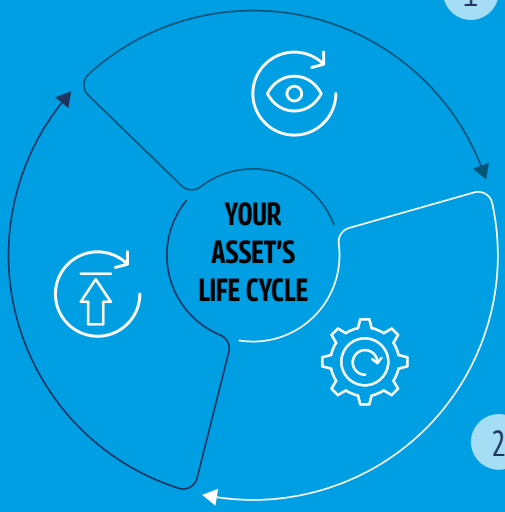
In the majority of the cases, the purpose of the PT inspection is to give simple confirmation that the tendons are still in an acceptable condition and that the structure continues to behave as intended. In other cases, PT inspection is a prerequisite for structural assessment, the design of repair and strengthening solutions and the execution of any necessary works. VSL is a specialist contractor and PT system supplier with more than 60 years of experience in the field and a long-term track record in engineering excellence and quality of execution. As a result, we have the in-depth expertise needed to carry out PT tendon inspections safely and efficiently with the necessary level of detail.

SAFE, RELIABLE AND EFFICIENT PT INSPECTION

- Desk study of as-built information combined with engineering judgement to plan any interventions required
- Visual inspections of the condition of the PT tendons and the structure; this can include hammer tapping of external tendons using VSL's proprietary decision-making support software
- Non-destructive ground penetrating radar (GPR) measurements to develop risk maps (to map humidity, chlorides etc) as a basis for intrusive inspection works
- Specific NDT depending on the suspected problems (ultrasonic-pulse-echography, electrical-capacitance)
- Use of inspection openings to look inside ducts, anchorage recesses or anchorages
- Endoscope inspection to provide detailed visual analysis of voids, corrosion and the grout's condition; sampling of the grout or filler for chemical analysis
- Chloride sampling and determination of carbonation depth
- Magnetic flux measurement to determine the location and extent of wire breaks
- Force measurements of the tendons using techniques such as VSL's Vibratest, hydraulic lift-off or the measurement of bow-force
- Use of grout void sensors to provide quality assurance during repairs and detect the onset of corrosion and measure corrosion rates during the service life
- Measurements of the integrity of the encapsulation where electrically-isolated tendons (EIT) have been applied



ASSET PRESERVATION, STRUCTURAL REPAIRS & UPGRADING



1

ASSET PRESERVATION

PREVENTIVE MAINTENANCE
INSPECTION
ASSESSMENT
MONITORING

2

STRUCTURAL REPAIRS

REPAIR
REPLACEMENT

3

UPGRADING

STRENGTHENING
CHANGE OF USE
RESILIENCE ENHANCEMENTS

- CREATIVE ENGINEERING & EFFICIENT METHODS
- IN-HOUSE STRUCTURAL TECHNOLOGIES
- OPERATIONAL SKILLS IN COORDINATION & EXECUTION

WE'RE READY TO MAKE YOUR PROJECT POSSIBLE!

VSL
A member of Bouygues Construction

WWW.VSL.COM