



▲ Works on a typical concrete section.

The Sluncová Viaduct at the construction of the “New Connection Prague Main Railway Station, Masaryk Railway Station – Libeň, Vysočany, Holešovice,” is the continuation of the left tunnel under Vítkov Hill and brings the double track railway line from the Main Station to Libeň.

The supplier of the entire section is a consortium of the companies Skanska DS, a.s., SSŽ, a.s., METROSTAV, a.s. and SUBTERRA, a.s. and the design engineer SUDOP PRAHA, a.s., the builder of the Sluncová Viaduct SKANSKA DS, a.s., Plant 77 – Bridges, the design engineer PONTEX, s.r.o. and the supplier of the post-tensioning system VSL SYSTÉMY (CZ), s.r.o.

The structure is the first implementation in the Czech Republic of a bridge structure using a longitudinal electrically insulated post-tensioning system. The use of this system not only improves the structure's durability due to the unprecedented protection of the prestressing steel against stray currents, but at the same time it is also exceptional from the standpoint of monitoring the post-tensioning system during the structure's operational life. In the longitudinal direction the deck is in the form of a box girder, with a three voided cross-section comprised of eight spans  $26 + 2 \times 36.7 + 4 \times 47.6 + 34$  m. The construction is divided into seven construction stages.

### Scope of the VSL work:

- Supporting the design engineer during the application of the VSL post-tensioning system
- Supply of the internal and external electrically insulated post-tensioning system

The post-tensioning system is comprised of internal and external tendons. The internal post-tensioning system has 12 tendons in stages 1 – 3 and 16 tendons in stages 4 – 7. One half of the tendons is coupled at the construction joints with the use of K CS Super (EIT) couplers and the second half of the tendons passes through the following concrete section at the end of which they are again coupled and tensioned. The internal tensioning system also includes tendons leading above the piers, approximately 10 m in length and typically 8 units per support. The internal post-tensioning system is comprised of a 19-strand system of VSL CS Super (EIT) tendons, which in combination with the plastic VSL PT-Plus® ducts ensures complete insulation of the tensioning cables from the support structure. For external tendons, the external 19-cable post-tensioning VSL A Monostrand (EIT) system is used.

The tendons are also electrically insulated; their tension can be adjusted and they are exchangeable. The monostrand type of strands specification is mainly based on



▲ Construction joint with couplers.

requirement of potential future re-tensioning. In total there are eight cables, which for spatial and economic reasons are anchored only in the end spans, with the use of concrete anchor blocks located inside of the bridge box. The impressive length of each cable – 272 m – is not the only technical rarity; the external tendons also have to overcome all angular deviations in the deviators and saddles from a total of six internal and two outer spans. To help with their development, experts from VSL International and VSL Switzerland were called in.

The most monitored parameter of this project was the already mentioned electrical insulation of the tendons. The measuring was conducted on an on-going basis, with the continuation of the concrete pour of each phase. At the end a final measurement was taken by JEKU s.r.o. The evaluating criterion for the insulation is the ohmic electrical resistance measured

during the passage of alternating current, impedance with value of 1 k $\Omega$ . This is a high value and even with relatively small defects on the encapsulation these values usually cannot be achieved. Nonetheless at an impedance of roughly hundreds of  $\Omega$ , the prestressing steel is very well protected against corrosion. In external and short tendons the impedance peak measured values were roughly in tens of k $\Omega$ , in the case of continuous repeatedly connected cables the values were usually ~ 1 k $\Omega$ .

From the standpoint of EIT technology, the Sluncová Viaduct is a referential project of European significance. During the implementation of this project it was confirmed that thanks to this type of technology it is possible, in the current construction conditions in the Czech Republic, to design efficient bridge structures made of post-tensioned concrete even in the case of electric railway lines.

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SŽDC, s.o.

**CONSULTANT:**

PONTEX, s.r.o.

**VIADUCT SUPPLIER:**

SKANSKA DS a.s., Závod 77 - Mosty

**DURATION:**

09/2006 – 11/2007

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▲ Placed ducts in webs.



▲ Construction joint with couplers.



▲ External tendon arrangement.



▲ External tendon stressing, length 272m.



▲ Impedance measuring, 12,1k $\Omega$  value achieved in the case.

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