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Limska Draga Viaduct – Fabrication and Erection of Orthotropic Plates

Viaduc Limska Draga – Fabrication et montage de la dalle orthotrope

Limska-Draga-Talbrücke – Werkstattfertigung und Montage von orthotropen Platten

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1. INTRODUCTION AND DESCRIPTION OF THE VIADUCT

The preliminary design of the Limska Draga Viaduct was made in 9 solutions. The solution chosen was the steel structure with box cross-section (Fig.1). The choice was dictated by the topography and geology of the site as well as the current economic situation. The relation between the design, fabrication, erection and quality assurance is shown on the orthotropic plate.

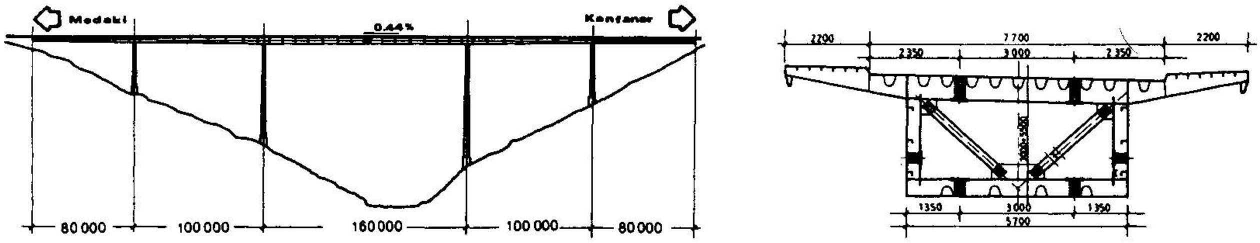

Fig.1 Longitudinal and cross-section

2. FABRICATION

The viaduct consists of 45 assemblies consisting of 8 parts each (Fig.2).

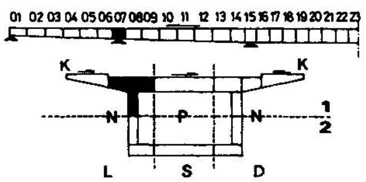

Fig.2 Assemblies

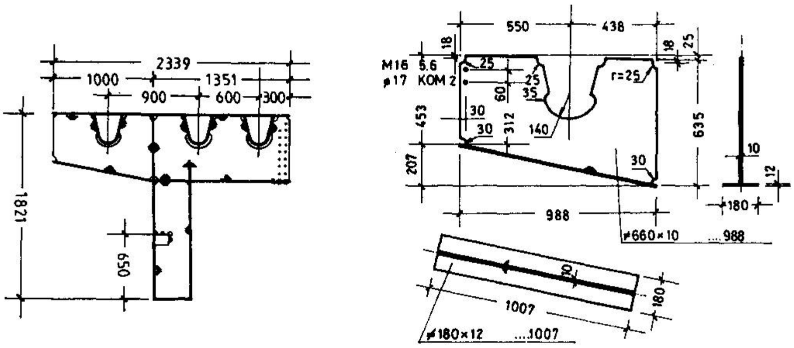

Fig.3 Computer made shop designs

Workshop designs were made by means of computer in three months and include over 2500 tons steel. The material was chosen in accordance with calculations and criteria against brittle fracture.

3. ERECTION

Erection of the assemblies was designed in a way to minimize residual stresses in the orthotropic plate welds. Temporary connection was done by conical bolts over the box ribs. This is done by means of a temporary device which carries the new assembly, which can thus be moved horizontally. The conical bolts along the upper chord were removed and the assembly was moved 3 mm. After welding the upper ortho plate, the same procedure is repeated for the lower ortho plate.

4. QUALITY ASSURANCE

Geometrical deviations are measured during fabrication and erection. Figs.4a and 4b show deviations of longitudinal stiffeners and transversal beams in the upper orthotropic plate for assembly No 38 during pre-erection.

Fig.4 Deviations of transversal beams and longitudinal stiffeners

Quality assurance was done in all stages of construction for welding in installation of high strength bolts, etc. Special attention was paid to non-destructive determination of mechanical properties of welded joints by measuring their hardness. Fig.5 and 6 present the results of hardness of shop and site welds.

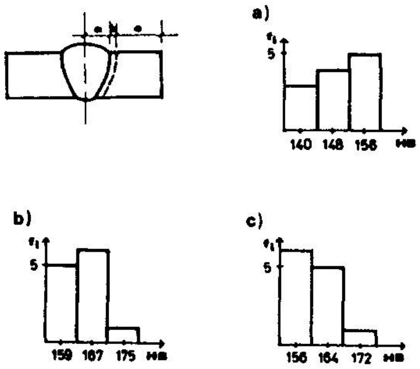

Fig.5 Shop weld

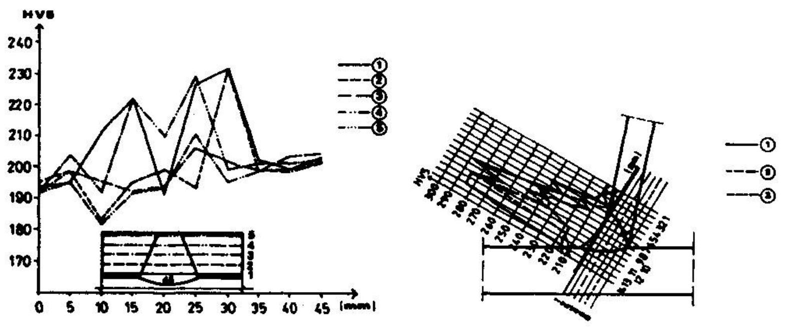

Fig.6 Site welds

The arrangement of hardness intensities are important for the assessment of the welds mechanical properties.

5. FATIGUE ASSESSMENT

Fatigue in an orthotropic plate is analyzed by estimation of traffic, by selecting details of higher fatigue strength and by assessing the location of longitudinal rib splice. Average daily passage of equivalent vehicles is n=1200.

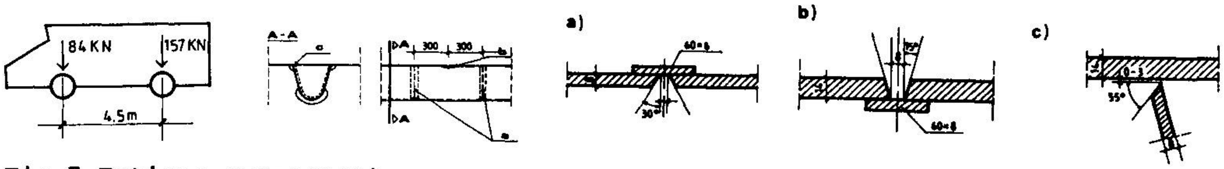

Fig.7 Fatigue assessment

6. CONCLUSION

Bearing in mind the interdependence of design, fabrication and erection of the presented orthotropic plate, together with adequate quality assurance, an effective interaction of design and construction technology has been achieved.