Zeitschrift: IABSE congress report = Rapport du congrès AIPC = IVBH Kongressbericht

Band: 12 (1984)

Artikel: Wheel and axle plant, Bangalore, India

Autor: Alimchandani, C.R. / Jagus, P.J. / Padalkar, J.S.

DOI: https://doi.org/10.5169/seals-12251

Wheel and Axle Plant, Bangalore, India

C.R. ALIMCHANDANI
Chairman & Manag. Dir.
STUP Consultants Ltd
Bombay, India

P.J. JAGUS
Director
STUP Consultants Ltd
Bombay, India

J.S. PADALKAR
Princ. Consult.
STUP Consultants Ltd
Bombay, India

Sprawling over an area of 120 hectares, on the outskirts of Bangalore City, the Wheel & Axle Plant is a gigantic project built for the Railways. The complex is designed for the manufacture of 70,000 wheels and 23,000 axles per year for national consumption and export. The main wheel and axle plant covers an area of over 50,000 sq.m. and the ancillary buildings including maintenance shops, stores, metallurgical laboratory and staff housing occupy an area of about 35,000 sq.m. The technologies utilized, achieved speed and economy of construction for these visually arresting building.

Due to the large floor area of the buildings, maximum use of natural light and ventilation had to be achieved whilst minimising the cost of construction and maintenance.

Therefore, it was proposed that concrete structures, both prestressed and R.C.C. be adopted instead of the conventional structural steel. Since column free spaces of 30 m were required for the main wheel and axle plant and the linking assembly shop, precast, prestressed tied arch girders were utilized. These were spaced at 12 m intervals and capped by precast folded plates. For the electrical and mechanical engineering maintenance shops and store buildings, since the span requirement was only 12 m, cast-in-situ conoidal shells, 6.5 cm thick, were used.

Both these structural forms were optimized to achieve maximum use of natural light and ventilation. This was done by correlating the height of tied arch girders, glazing across tied arch girders, height of conoidal shell elements, spacing of shells, glazing area across shells and reflecting interior surfaces of shells. Thus, a pleasant interior environment and saving in energy was achieved without compromising structural economy. The design of the plant also took into consideration the possibility of concrete fatigue due to high ambient temperature generated in the melting shop.

The girders were tested at a load of 240 t, which was 1.25 times their service load. As the rise of the girder at its central point was 5 m, and the load was heavy, the girders were tested horizontally in pairs, with two restraining frames at ends. Jacks with a common power source were used to apply the loads at 11 node points simulating the actual loading conditions.

The project represents an optimization of functional requirements, economy of construction and maintenance, aesthetic appeal and conservation of energy, achieved by a complete familiarity with design and construction technologies and by the innovative adaptation of these technologies to the environment.

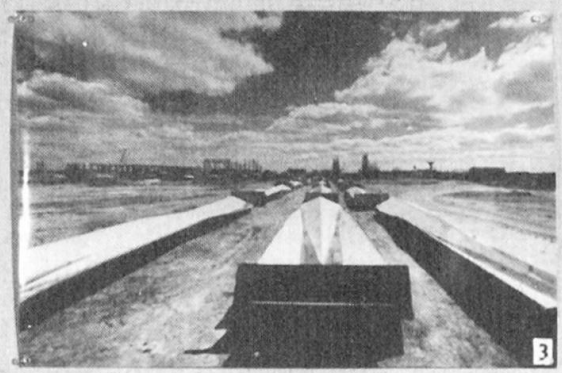
WHEEL & AXLE PLANT, BANGALORE, INDIA

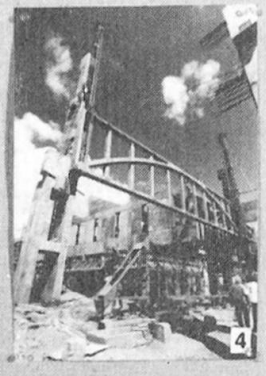
One of the largest industrial plants in South Asia. Producing 70,000 wheels and 23,000 axles for the railways. Total area 85,000 sq. m. including main building 51,000 sq. m. and ancillary buildings 35,000 sq.m. Functional requirements and aesthetic appeal achieved by use of precast prestressed tied arch girders, precast folded plate elements, and conoidal shells creating natural lighting and conservation of energy. Design takes into consideration structural economy and concrete fatigue due to high ambient temperatures.

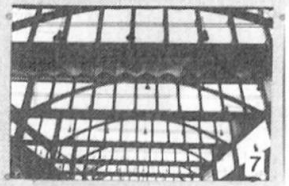
1 EME Maintenance shop. Metallurgical Laboratory in foreground.

2 Interior view of EME Maintenance Shop with its natural lighting and pleasant environment.

3 Mini precasting factory on site.







4 Lifting 40 T precast prestressed tied arch girder 30 M span.
5 Tied-arch girders erected and in position
6 6 cm thick folded plate element 12 m.
7 Folded plate elements in position