

New Concept for Main Cable of Suspension Bridge

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Summary

Aerial Spinning (AS) method and Prefabricated Parallel Wire Strand (PWS) method have been used for a parallel wire cable of a suspension bridge. These two methods to be adopted have been selected by the conditions and situations of the project. This paper discusses the actual facts on these two methods based on the experiences of the author, and proposes the improvements of the system and the erection methodology of a suspension bridge cable.

The author recommends to apply the PWS method with further improvement rather than the AS method, since the PWS method is basically superior to the AS method from the viewpoint of the quality of installed cable and the capability for improvement. The new concepts on the improvement of PWS herein proposed are (i) to assemble wires as a PWS at construction site, (ii) to make partial bend unlike the conventional straight PWS and (iii) to use the separate reference strand for sag adjustment.

Keywords: cable; suspension bridge; PWS; AS; cable erection

1. Introduction - Feature of Suspension Bridge Cable -

1.1 AS (Aerial Spinning) Method

In AS method, the "Reeling work", in which the wire coil is rolled to reel, is performed in advance of "Spinning work". The wire from the reel being set on unreeling equipment (Unreeler) is hooked around Spinning Wheel and carried out by hauling rope with high speed (400-700m/min) under predetermined tension. Making those wires go back and forth among both anchorages of a suspension bridge, the number of predetermined cycles repeats installing wires into strand shoe or saddle, and finally strand is formed. In AS, 1 strand is constituted by many wires, for example, it becomes 200 to 500 wires.

In recent years, with regards to AS method, "Control Tension Method" has been commonly used, in which wires carried are span in the lower tension than free hanging tension. In this method, as the spinning tension of wire is controlled mechanically with 30 to 80 % of free hanging tension, a part of wire's weight is loaded on catwalk.

The end of wires is connected by using "a wire joint (wire splice)", and each wire forms an endless loop in 1 strand. After binding of strand, "Sag adjustment" is performed at night when temperature of strand is stable like the PWS method.

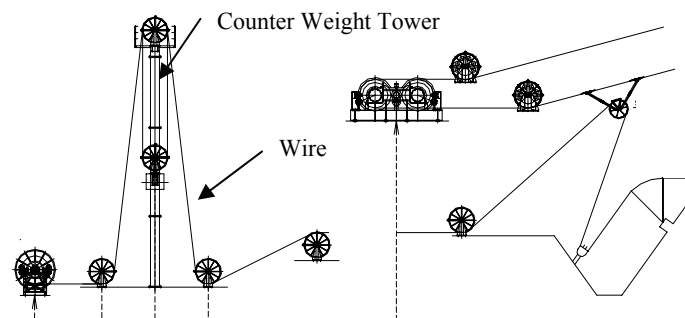


Fig.1: Schematic View of AS

Even though the hauling speed in AS method is much faster than PWS method, the working period and the manpower to install the AS strands are much more than PWS. It has been noted that the