

An Automatic Walking-type Launching System and Its Application

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Summary

This paper mainly introduces and describes the operation principle, component, main technical performance and features of the Automatic Walking-type Launching System (AWLS for short), and applications of the AWLS in Jiubao Bridge and other several bridges construction.

Keywords: Jiubao Bridge; Incremental launching method; Launching system; Automatic; beam-arch composite bridge; Girder; Walking-type; Dragging-type.

1. Introduction

Incremental launching method (ILM for short) is widespread used in construction of medium-span bridges, in which usually a dragging-type launching system is adopted. As for construction of long-span bridges with complex structure by ILM, due to its complex loads, the traditional dragging-type launching system is no longer applied. This paper gives an in-depth study of the technics of the AWLS based on Jiubao Bridge construction project.

2. Project Background

Jiubao Bridge is located in Hangzhou city of Zhejiang province in eastern China. It is a three-span continuous beam-arch composite bridge with a span arrangement of 3×210m. ILM is adopted in the erection of Jiubao Bridge. When the first span of steel beam-arch structures is finished assembly on platform, they are pushed out of the platform by ILM. Then begin with the next span with the same method. Finally when the third span is finished assembly, they are pushed forward integrally by ILM. Due to its heavy launching weight, long cantilever, complicated structural force, high demanding for launching system, a new type of pushing system-the AWLS instead of the dragging-type launching system is developed to ensure Jiubao Bridge construction by ILM successfully. Fig.1 shows three spans of beam-arch structures under construction.

3. The Main Construction Principle of the AWLS

The AWLS mainly consists of three parts: the launching mechanical system, the launching hydraulic system and the automatic control system. The launching mechanical system is mainly composed of three-dimensional hydrocylinder, the launching hydraulic system is a system for supplying with mechanical power, while the automatic control system is to receive and send instructions to realize control of the whole system. Fig.2 shows the system diagram of the AWLS.

The Operation Principle of the WALS is as follows: First the whole beam-arch composite structure is integrally lifted over multipoint, then the longitudinal jacks push it forward, finally it drops down on the temporary support, and the longitudinal jacks returns back. In this cycle of "lifting", "pushing", "dropping", and "returning" the beam-arch composite structure is being pushed forward. Operation principle diagram of the AWLS is shown as Fig.3.



Fig. 1 Three spans of steel beam-arch structures under construction

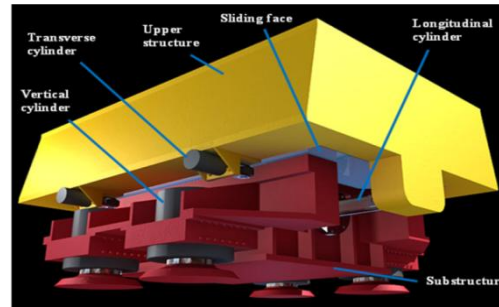


Fig. 2 System diagram of the AWLS

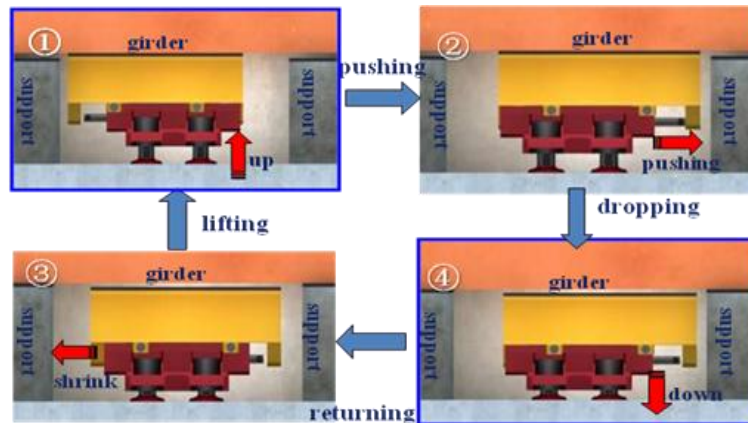


Fig. 3 Operation principle diagram of the AWLS

4. Conclusion

In the erection of large-span bridge with complicated structures by ILM, due to its complicated structural stress and deformation, big launching reaction, and high demanding for launching equipment, a new launching system-the AWLS is developed in this paper instead of the routine dragging-type launching equipment. There are many advantages about the AWLS. It combines the functions of lifting, pushing and rectifying into one system, it enjoys highly automation. By changing the sliding surface from the bottom of girder to inside the launching equipment, horizontal thrust on launching piers will be drastically reduced, thus the AWLS turned to be a kind of self-balancing launching system. Compared with other types of launching system, the AWLS would be more safety and reliability. Meanwhile the AWLS can be widely used in construction of bridges with various kinds of structure. Up to now, the AWLS has been successfully applied in several bridge construction projects.

5. References

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