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Recent Achievements of Bridge Engineering in China

Récents progrès dans le domaine des ponts en Chine

Neue Entwicklungen des Brückenbaus in China

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1. INTRODUCTION

During the past 40 years significant development in bridge engineering has been achieved in China.Up to now there are 75 bridges over the Yellow River and about 20 bridges over the Yangtze River. The progresses made are characterized not only in bridge quantity and span length, but also in their structures and construction technics.

2. CONCRETE BRIDGE

A large number of PC simply supported beams, most of which are standard in design, prefabricated and erected by special machines, have been employed in chinese railways and highways. For instance, more than 30000 pieces of post-tensioned PC girders and 800 pieces of pre-tensioned PC girders have been erected on railway lines only. The maximum span of this bridge type has reached 40m for railway and 60m for highway.

Free cantilevering method and incremental launching method have been widely used for medium and large span PC bridges. For instance, 18-span-continuous girder totaling 1340 m in length of the 2nd Qiantangjiang River Bridge are under construction by free cantilevering method and its 47 approach spans are being erected by incremental launching method. Many other construction methods ,such as revolving method,lowering method and lifting method have also been adopted for various bridges.

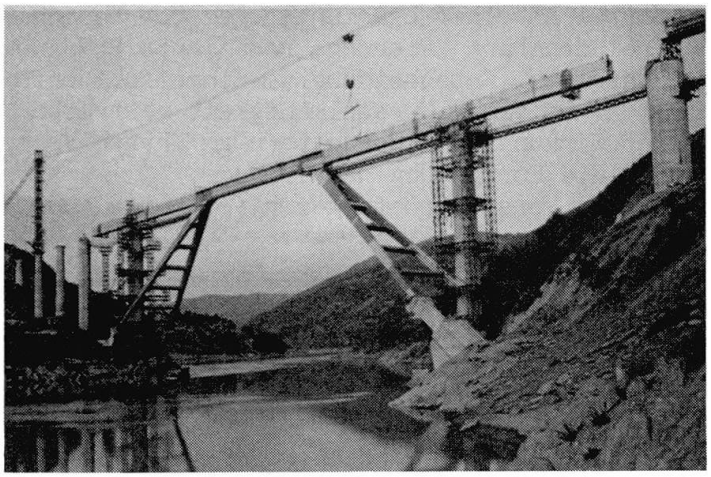

Fig.1 Hanjiang River Bridge under construction

2. STEEL BRIDGE

In the 1950's low carbon steel was used for bridge structures and soon it was replaced by 16Mnq low alloy steel. Since the 1970's 15MnVNq low alloy steel with yielding strength of 420 Mpa has been adopted for new steel bridges. Many of them are composed of welded members with high strength

bolt connections.The maximum thickness of steel plates is 80mm and the maximum diameter of bolts is 30mm. 35VB steel of 850 Mpa ultimate strength is recently adopted for high strength bolts.

Various types of steel bridge structures, such as simply sopported girder,continuous girder, truss stiffened with flexible arch, slant-legged rigid frame,cable-stayed bridge etc. have been built in past decades.For example, the Han- jiang River Bridge is a slant-legged rigid frame with 176m span length. Lowering method was adopted for its construction. The two legs were assembled upright and lowered down to their final positions,then the mid part of main girder of box section is lifted and connected to the upper ends of the two legs, forming a stable structure [Fig.1]. Finally the side parts of the main girder are assembled by cantilevering.

3. CABLE-STAYED BRIDGE

Since 1975,when the first cable-stayed bridge was built,about 30 bridges of this type have been completed in China. Most of them are highway bridges and only one for railway. Among them nine bridges have their main spans above 200m,and the maximum spans of 260m and 288m are reached for concrete and steel respectively. Special factories have been established for producing cables,the maximum capacity of which is above 10000 KN. At present ,more than 7 major cable-stayed bridges with main spans between 400m and 600m are under construction or being designed.

Some typical bridges for both highway and railway in China are given in the following table.

SOME TYPICAL BRIDGES IN CHINA

	BRIDGE	STRUCTURAL TYPE	SPAN(m)	COMP.YEAR
Highway				
Steel	Dukou Bdg.	arch truss	186	1966
	Dongying Bdg.	cable-stayed	288	1987
	Nanpu Bdg.	cable-stayed	423	*
Concrete	Luoxi Bdg.	continuous frame	180	1989
	Yibin Bdg.	arch	240	1990
	Jangjehe Bdg.	arch truss	330	*
	Yonghe Bdg.	cable-stayed	260	1987
	Wuhan 2nd.Bdg.	cable-stayed	400	*
Railway				
Steel	Nanjing Bdg.**	continuous truss	160	1968
	Hanjiang Bdg.	slant legged frame	176	1982
	Jiujiang Bdg.**	langer arch	216	*
Concrete	Yongdinghe Bdg.	arch	150	1966
	Zhuozanghe Bdg.	slant legged frame	82	1982
	Hongshui R.Bdg.	cable-stayed	96	1981

*--under construction **--railway/highway combined bridge