



# COLFAX PUMPS SUPPORTING CHINA'S THREE GORGES DAM

## Challenge

As well as being the largest dam in the world, the Three Gorges Dam in China has numerous other cutting edge features. With a total capacity of over 22,400MW, the oil pumps for the governing system in the hydropower plant are required to operate continuously 365 days per year, and present a huge engineering challenge. The pumps originally installed by another pump company broke down, so Colfax was brought in to replace them.

## Solution

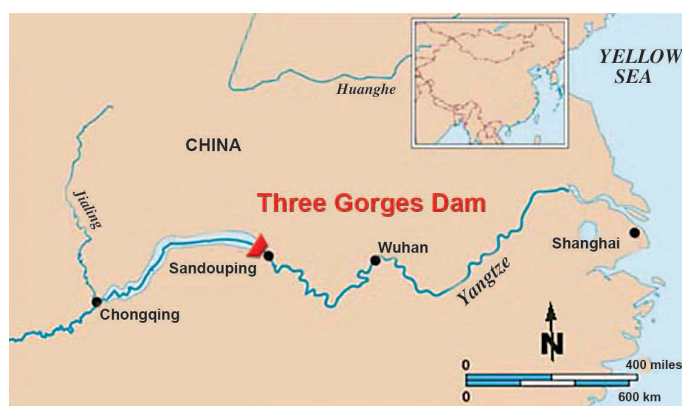
Allweiler three-screw pumps were selected due to their safety, quality standards and local support. These are known to be some of the best quality pumps currently available on the market. After examining the existing broken pumps, we proceeded to perform a modified installation. This allowed us to install our pumps within the already-existing framework.

## Results

Our products proved to be more cost-effective in terms of their durability, and have been installed in the dam. They are now running and have not experienced any breakdowns. We are able to ensure their safe running and continue to offer the best possible support, including periodical site visits. They are now running well throughout the year, and coping with the rigorous pressures put on them.

## The three gorges dam and the unprecedented challenges

The Three Gorges Dam is a hydroelectric river dam that spans the Yangtze River in Sandouping, Yichang, Hubei, China. It is the largest hydroelectric power station in the world. The actual dam was completed in 2006, but the work on the hydroelectric components is still ongoing. The project has been undergoing since 1994 and is expected to raise the local water level to over 175 m above sea level when it is completed.



*The Three Gorges Dam on the Yangtze River, China*

The Three Gorges project involves 32 power generator units (14 on the left bank, 12 on the right bank, and 6 underground). The project produces hydroelectricity (which produces less carbon emissions than most conventional power sources), and reduces the potential for floods downstream by providing flood storage space. After completion, the expected annual electricity generation will be over 100 TWh.

The pumps in the hydropower plant are required to operate without interruption, which means that their quality and durability are of paramount importance. In particular, the components need to be of the highest possible quality, to be able to operate safely under such stress. As well as general wear and tear, there are also several other more specific problems caused by the unique circumstances of the dam.

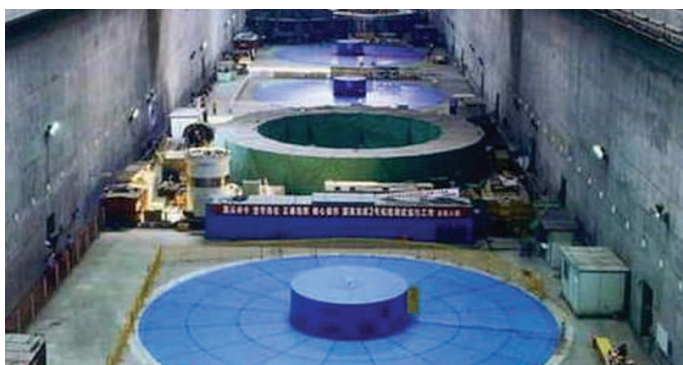


One of these challenges was dealing with the variations in outlet pressure. It is comparatively simple to design components to operate under steady pressure. Under the variations, however, pressure on the various components is extremely difficult to predict accurately and handle. In addition to damage to its housing, the frequent variations in pressure often lead to the damage of rotating and bearing parts of a pump.

Originally, the project was given to another pump manufacturer, of which the pumps finally failed to meet the unique demands of this project and even broke the housings. When we were brought into the project, we faced unique compatibility challenges in replacing the pumps with the existing set-up. However, knowing the precise operating conditions, we were able to select the most reliable pump type to deal with it.



*Allweiler SM three-screw pump installed on site*



*Inside the left-bank power station*

## **The most reliable pumps**

Allweiler SN, SM and BAS three-screw pumps were selected based on their proven safety, quality standards and local support. Specifically, 16 units of SMH1300 pumps were used to replace the original pumps in the left bank hydropower plant. Additionally, another 48 units of SMH1300 pumps were installed in the new right bank hydropower plant. This meant that a total of 64 SMH1300 pumps were installed as governor pumps in the Three Gorges Dam. In addition to these, low pressure pumps were also installed for the lube oil system of the hydropower plant. These were 14 units of SN pumps and one BAS pump.

The pumps were used for a variety of different purposes. One of the unique applications is pumping hydraulic oil to open and close the heavy flood gates and regulate the water inlet. The SM, governor pumps (lube oil feed/boost pump) were selected due to their heavy duty design. They are used in the hydraulic system for opening and closing the water turbine's inlet blade. To cool the water turbine bearing, the SN lube oil circulation pump, the lube oil drain pump, and the BAS pump were used as well.

## **The best possible service**

To offer the best possible service, Colfax has taken a number of different steps. A local manufacturing and service center was formed in Wuxi, China, in 2004. There are a total number of 100 workers based in this 5988m<sup>2</sup> manufacturing and service center, which is furnished with a broad array of machining equipment, test stations, and product selection software. One of the major functions of the centre is that it can provide after-sales service to customers in the region.

The centre is home to a team of professionals who can provide on-site repairs, a 24 hours service hotline, and maintenance plans to our customers. It also allows for machining, assembly and testing of pumps. In order to minimize customer's downtime, a number of spare parts are also kept at the plant. This means Colfax can meet the specific needs of our customers in the region.

In this project, we organize seminars for the design of the Turbine System, and have had technical meetings with the project owners, design institutes and subcontractors on many occasions.

Moving forward, our standard quality control testing procedures can be applied to ensure the quality of the pump and offer the best possible service. This is our standard test, and forms the basis of quality control. To date, there have been no problems involved with the installation or the pumps themselves.

Other services which will be offered to the clients in the future include periodical site visits. These will be given by highly-experienced personnel, and are expected to offer good value to the client. Another service which will be provided is periodical maintenance training for the operators of the equipment, especially for newly-arrived staff members. Finally, to ensure a fast turnaround in the event of a problem, key spare parts of the pump will be kept in storage. This means that if parts need to be replaced, it can be done as quickly as possible, in a structured way, with minimal delay and potential issues.



Colfax manufacturing and service centre in Wuxi, China

## About colfax asia pacific

Colfax Asia Pacific serves the unique fluid-handling needs of customers in the region, with a broad product portfolio, deep application expertise and strong local presence. The network of Colfax offices, engineering support centers, production facilities, and authorized distributors and agents in Hong Kong, China and India helps ensure responsive delivery of and service for Colfax pumping systems and replacement parts. For more information, please visit: [www.colfaxasia.com](http://www.colfaxasia.com).

*"Where our competitors struggled, Colfax was able to step in swiftly and provide cutting edge solutions for this milestone project of unprecedented scale"*

- Richard Leertouwer, Director - Sales & Marketing, Asia Pacific

## About colfax corporation

Colfax Corporation is a global leader in critical fluid-handling solutions, including the manufacture of positive displacement industrial pumps and valves used in global oil and gas, power generation, marine, naval and a variety of other industrial applications. Key product brands include Allweiler, Fairmount Automation, Houttuin, Imo, LSC, Portland Valve, Tushaco, Warren and Zenith. Colfax is traded on the NYSE under the ticker "CFX". Additional information about Colfax's products, businesses and practices is available at [www.colfaxcorp.com](http://www.colfaxcorp.com).

## About allweiler

Allweiler is Germany's oldest pump manufacturer, with fully integrated operations and the broadest product offering of precision centrifugal, three-screw, progressive-cavity, propeller, peristaltic, rotary-lobe and macerator pumps, as well as large skid systems. Located in Radolfzell, Bottrop and Gottmadingen, Allweiler is a technology leader in commercial marine, oil and gas, chemical processing, specialty chemical, and waste and wastewater applications. Allweiler is a business unit within the Colfax Corporation. For more information, please visit: <http://www.allweiler.de>.



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