

## Air-flow dyeing machines in textile production Guangdong, China

### water scarcity impact



Reduced withdrawal	●
Reduced consumption	
Improved water quality	
Increased productivity	●
Net basin benefit	

### volumetric impact

362 000 m<sup>3</sup>/yr

### capital cost

\$1 968 000



### estimated unit cost of water

55 ¢/m<sup>3</sup>



### Water Stress

Guangdong, China



■ Arid & low water use	■ Low (<10%)
■ Low to med (10-20%)	■ Med to high (20-40%)
■ High (40-80%)	■ Extremely high (>80%)
■ No data available	

### Water Stress Map:

F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aqueduct Global Maps 2.1."

### Confidence level

● Low ● Medium ● High

### Water Scarcity Impact Key

● Main ● Minor

### Credits

We would like to acknowledge Rong Chen and Zhenzhen Xu of IFC for their input in the preparation of this case study.

### Project Overview

The Zhaoqing Jiarong Knitwear Dyeing and Finishing Company is located in the Guangdong Province, within the city of Zhaoqing. Its annual dyeing and finishing capacity is 15 000 tonnes of knitted fabric.

As part of China's five-year plan launched in 2011, all of China's textile manufacturers must reduce energy and water use by 16% and 30% respectively by 2015 or face a penalty fine or closure.

The International Finance Corporation (IFC) China Water Program was set up to facilitate financial investment in water efficiency projects within the four major textile producing provinces of China, one of which is Guangdong.

The Jiarong factory upgraded its conventional jet dyeing process to air-flow dyeing machines. This reduces the water requirement of the dyeing process. The intervention achieved a 53% reduction in withdrawal per tonne of material produced.

The interventions were self-financed by the Jiarong factory with support from IFC with the water and energy efficiency auditing process.

### Key Elements

- The IFC commissioned specialists to conduct a water efficiency audit of the factory. IFC shared the financial cost with the factory.
- Traditional jet dyeing and overflow dyeing machines were replaced by air-flow dyeing machines.
- Government policy mandates a reduction in water use.

### Key Outcomes

- 362 000 m<sup>3</sup> reduction in water withdrawal per annum.
- Compliance with new legislation, mitigating business risk.
- Payback period of 3.7 years achieved through associated energy savings.



Guangdong, China

### Intervention Features

- Water audits
- Education, technical training and capacity building
- Enforcement of quotas
- Textile processing technologies

### Project Levers

#### (1) Government policy

Government policy introduced in 2011 mandated that the textile industry should reduce its water use by 30% by 2015, compared to 2010 levels. Failure to comply results in fines and potential closure.

#### (2) Independent audit and advice

The IFC commissioned industry recognised specialists to conduct an audit and recommend options for reducing water and energy consumption. Access to this expertise was a major driver for Jiarong to join the China Water Program.

#### (3) Enabling technologies

The air-flow dyeing machine uses an air jet rather than a water jet to dye knitwear. The overall reduction in water and energy use was 53% and 50% respectively per tonne of material processed. Jiarong introduced twelve of these new machines to replace conventional dyeing technologies.

#### (4) Finance

IFC was able to demonstrate to Jiarong the payback period for the recommended interventions. This provided the business case for the factory to invest. The air-flow dyeing technology is new to the company and required staff to be trained in its operation. The training was provided and funded by the National Resource Defence Council (NRDC) and the IFC.

“A 53% reduction in water abstracted per tonne of material processed, amounting to 362 000 m<sup>3</sup> annually”

### Outcomes and Challenges

The reduction in effluent volumes is likely to cause an increase in the pollutant concentrations of the factory's wastewater streams. In response to this, the Jiarong factory intends to modify its wastewater treatment facility. During the auditing process, it was proposed that cooling water from factory processes should be mixed with the wastewater to improve its quality and to also lower wastewater treatment costs.

A challenge to the uptake of water reduction strategies is access to finance. IFC is working with the Bank of Beijing to increase the availability of loans to small to medium scale enterprises by sharing the risk of these loans through the provision of guarantees and assistance in the evaluation of applications. This will facilitate other factories in implementing interventions such as those at Jiarong.



Above: Traditional Jet Dyeing machine ©IFC; New Air-Flow Dyeing machine ©IFC