

# 橢圓管之蒸發式冷卻器研發

執行單位

國立臺北科技大學

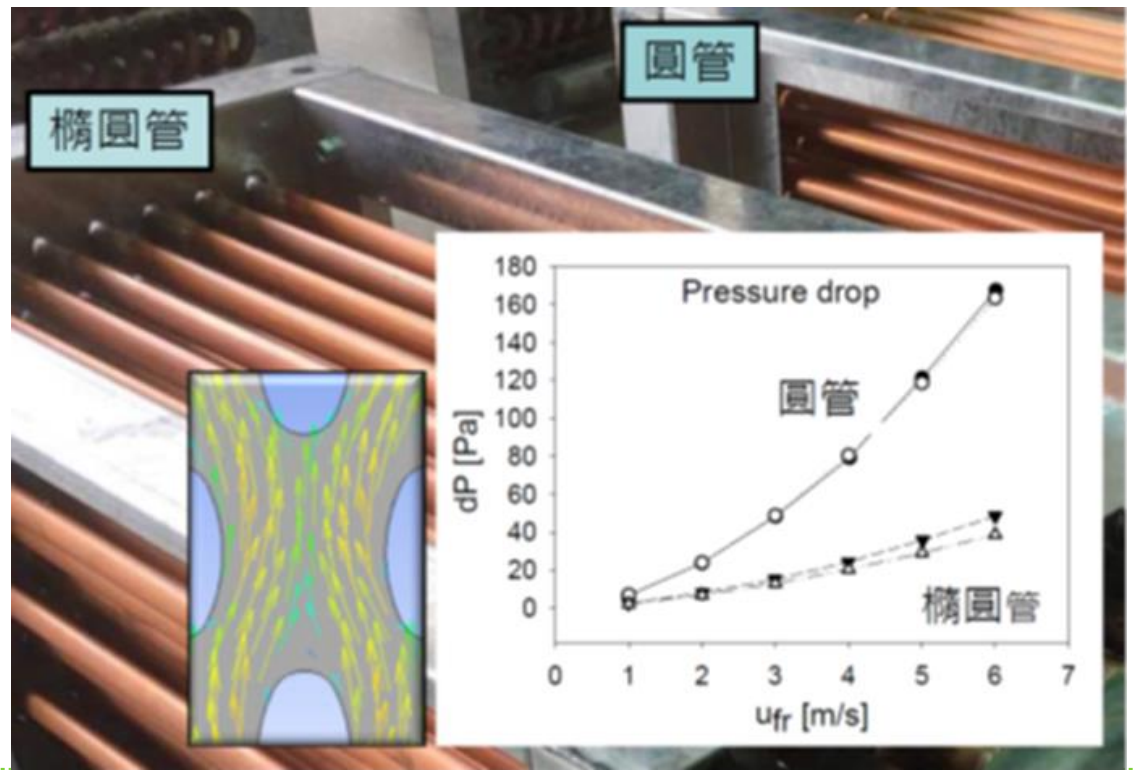
計畫主持人

簡良翰

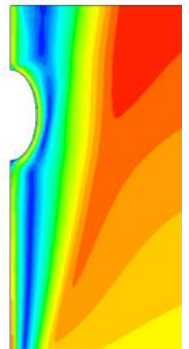
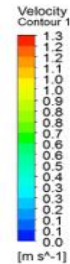
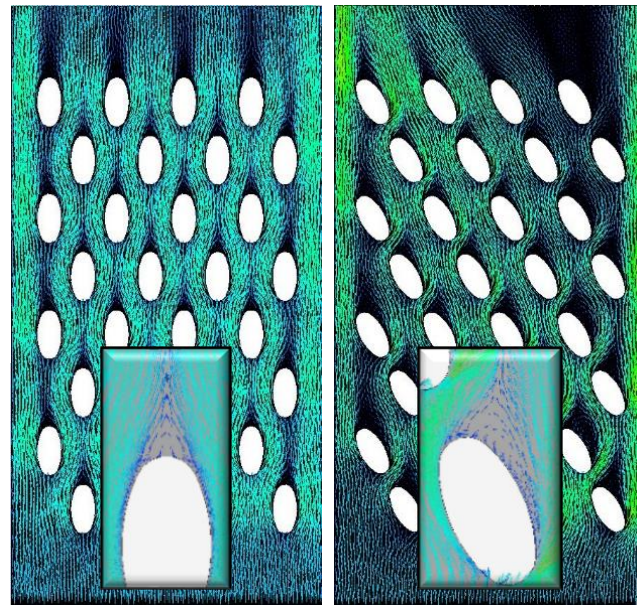
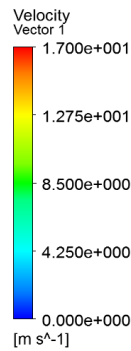
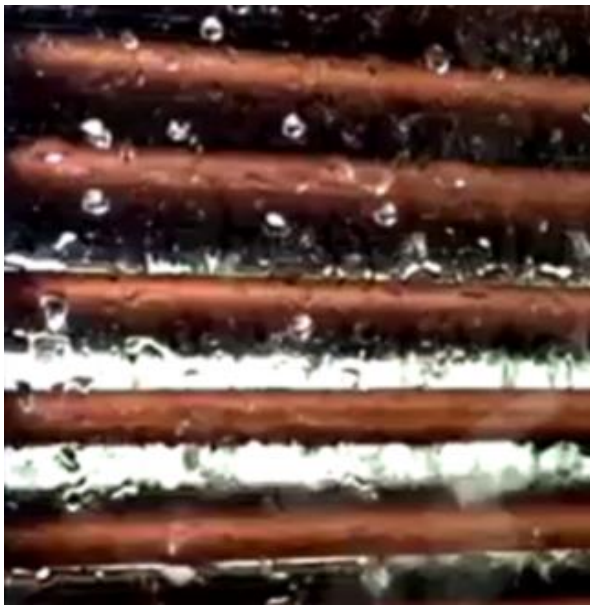
- 開發橢圓管蒸發式冷卻器；建立低風阻、高均勻度灑水技術，使其風機耗能節省三成以上；可降低空調設備及各種工業製程流體冷卻；對國內整體住商及工業節能均有顯著效益。

專利/智財佈局:

橢圓管在熱交換器的應用已久，相關專利多已過期，國外廠商僅就管陣兩端U接頭的連接技術提出專利，然而其緊密排列方式未必有好處。經本計畫以灑水裝置與管陣配置之專利技術，搭配風量雨水量控制，使橢圓管低風阻之效益充分發揮。



- 本計畫藉由流場與熱質傳數值模擬及實驗研究，管內外整合之創新熱質傳分析技術產出領先國際之學術成果，產出國外研討會論文三篇，國際期刊論文兩篇；培育2位博士生、8位碩士生。建立低能耗橢圓形管排幾何參數、高均勻度灑水技術。目前已完成以實測驗證橢圓管之壓損僅為圓管三分之一；將提出相關專利。



# Research and Development of Evaporative Coolers Using Elliptic Tubes

Execution Unit

National Taipei University of Technology

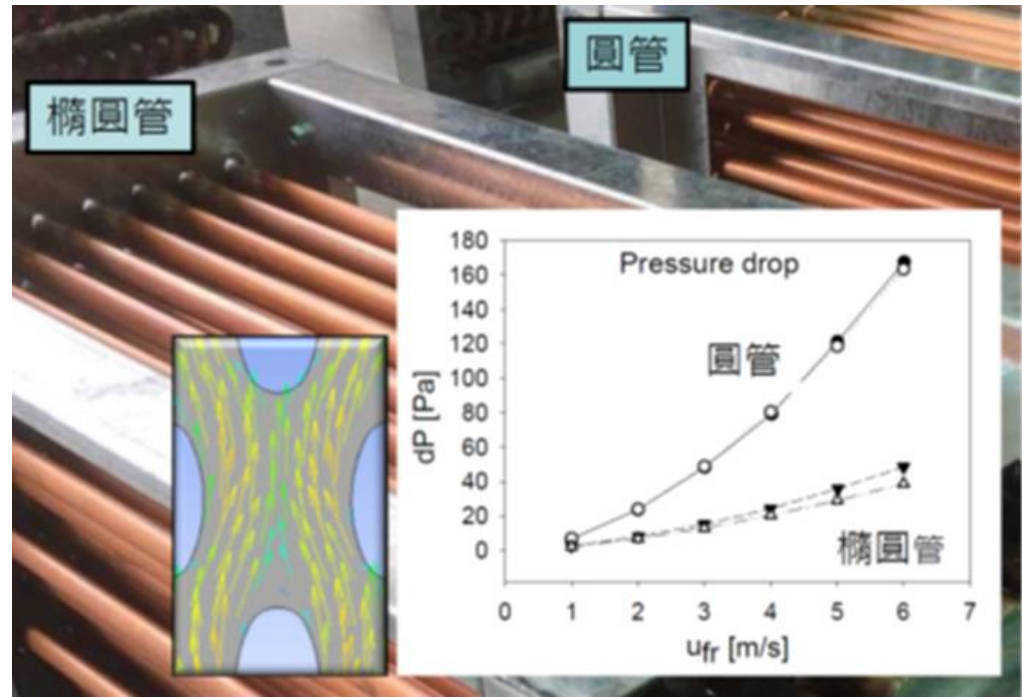
Project Director

Liang-Han Chien

- **Content:** This project aims to develop a new evaporative cooler using elliptical tubes, and the technologies to yield low air flow resistance and high water flow uniformity. These technology can reduce 30% air flow pressure drop and conserve energy in air conditioning and process cooling.

Patent strategy:

Elliptical tube has been used in heat exchangers for years, the latest patent are mainly regarding the U-tube connectors. The water spray device and tube arrangement will provide better cooling efficiency without violating those patents. Invention patents will be filed soon.



- **Introduction:** This project aims to develop a new evaporative cooler using elliptical tubes. Base on the conjugate numerical simulation of internal and external flow field and heat transfer, low air flow resistance tube bundles and high water flow uniformity spray devices are developed. Experimental data of the elliptic tube bundle prototype showed 30% lower air flow resistance than the circular tube bundle at the same air flow and cooling capacity. Two doctoral students and eight master students are involved in this project. Their findings are published in three international national journal papers and two international conference papers.

