

# TWISTED TUBE® HEAT EXCHANGERS

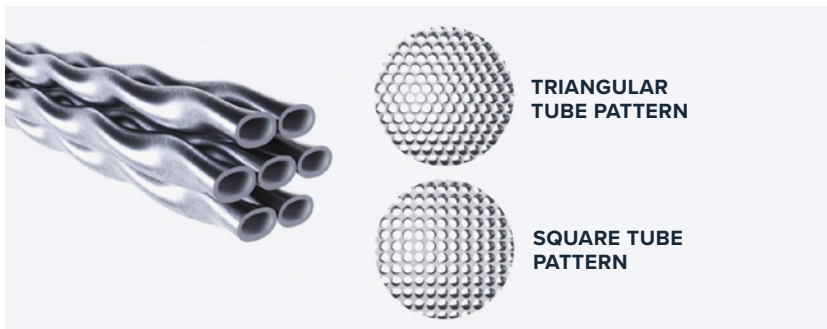
## PROCESS OPTIMIZATION WITH A TWIST

### Real Innovation for Real Results

Conversion to TWISTED TUBE® Heat Exchangers requires no modifications to existing shells and piping, shortening shutdown and payback time. The ease of the process is similar in principle to replacing an old lamp or bulb with a new, low-consumption version, while the long-term savings and benefits — including reduced CO<sub>2</sub> emissions from fired heaters — are exponentially greater throughout a range of applications.

### Designed Differently

Metalforms Heat Transfer's proprietary TWISTED TUBE® Bundle puts a new spin on tubular exchanger design, with unique helix-shaped tubes arranged in a cleanable triangular pattern that leaves baffles and their potentially costly problems behind. Each tube is firmly surrounded by at least three adjacent tubes and supported approximately every four to six inches while still allowing fluids to swirl freely along its length. This revolutionary system eliminates the flow-induced vibration mechanisms frequently encountered with segmentally-baffled conventional shell and tube heat exchangers, especially when flow capacity is increased.



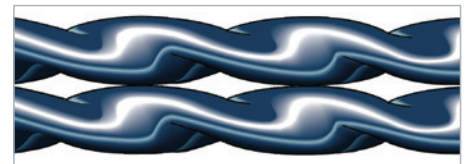
The "twisted" baffle-free arrangement of the tubes provides gaps that facilitate convenient cleaning on the shell side while the round ends of the tubes allow for the use of conventional tube-to-tubesheet joints. Both the profile of the individual tubes and the width of the connection points between tubes can be varied to elongate cleaning lanes, further accommodating routine maintenance.

### Potential Benefits

- » Increased duty of up to 40%
- » Decreased pressure drops
- » Eliminate flow-induced vibration
- » Fouling mitigation
- » Improved cleaning efficiencies
- » Decreased emissions from downstream fired heater

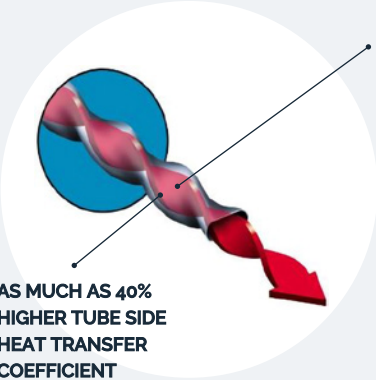
### Applications

- » Crude preheat
- » Feed/effluent for
  - » Reformers (CCR and semi-regeneration)
  - » Hydrotreaters and Hydrocrackers
- » Alkylation
- » Overhead condensers
- » Reboilers (kettle and J-shell)
- » Lean/rich amine
- » Compressor interstage coolers



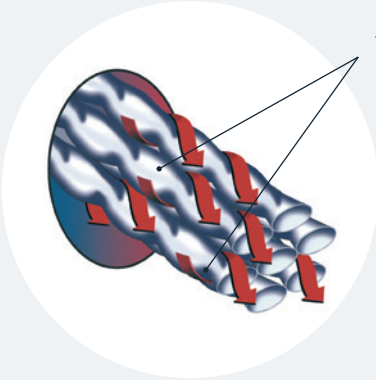
Tube-to-tube contact points at approximately 4 inches eliminate vibration. Each tube is "locked" in place by at least three adjacent tubes.

TWISTED TUBE® Heat Exchangers can provide a higher heat transfer coefficient than any other type of tubular heat exchanger, with positive impacts on both tube side and shell side flow.



**HIGH LOCALIZED TUBE WALL SCRUBBING EFFECT TO COMBAT FOULING**

**AS MUCH AS 40% HIGHER TUBE SIDE HEAT TRANSFER COEFFICIENT**



**UNIFORM SHELL SIDE VELOCITY CAN REDUCE FOULING CAUSED BY DEAD SPOTS.**

### Improved Tube Side Flow:

- > Swirl flow in tubes creates turbulence to improve heat transfer.
- > Powerful turbulent flow is achieved even at low velocities and/or high viscosities.

### Uniform Shell Side Flow:

- > Complex interrupted swirl flow on the shell side induces maximized turbulence to improve heat transfer, while minimizing pressure drop.
- > Design provides greater effective length and surface area than shell and tube exchangers while flow distribution and velocity are consistent across the entire bundle.

## LEARN MORE TODAY

Contact us today for a free evaluation with our engineers to see how our twisted tube heat exchanger technology can help you increase energy efficiency, assist in reaching your environmental stewardship goals through reduced emissions and increase profitability.

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