



# Oil Sands Producer Conquers Heat Exchanger Fouling

## HOW EXCHANGER INDUSTRIES LIMITED'S ANTIFOULING TECHNOLOGY SAVED OVER \$1M ON CLEANING COSTS ALONE

Exchanger Industries Ltd is a leading supplier for the design and manufacture of shell & tube and air-cooled heat exchangers.

## HIGHLIGHTS

### CLIENT

Major Canadian Oil Sands Producer

### APPLICATION

Shell & Tube Heat Exchanger

### CHALLENGE

Heavy Fouling

### SOLUTION

Next Gen Fluoropolymer Coating

### RESULTS

- > No cleanings in 7 years; > \$1M saved
- > U-values at or near baseline since installation
- > Prolonged heat exchanger lifespan
- > Technology expanded to other sites



# Heat Exchanger Fouling Costs Industrialized Nations Billions Each and Every Year

## THE CHALLENGE

### Severe exchanger fouling in the oil sands

Heat exchanger fouling is a truly global problem, with some estimates placing its cost for major industrialized nations in excess of US\$4 billion annually. According to one report, around 15% of a process plant's maintenance costs can be attributed to heat exchangers and boilers. Of that 15%, half is likely caused just by fouling.<sup>1</sup> Indeed, for a major oil sands producer with over 200,000 barrels per day of in situ production across multiple sites, exchanger fouling had become a significant operational problem with wide-ranging impacts.

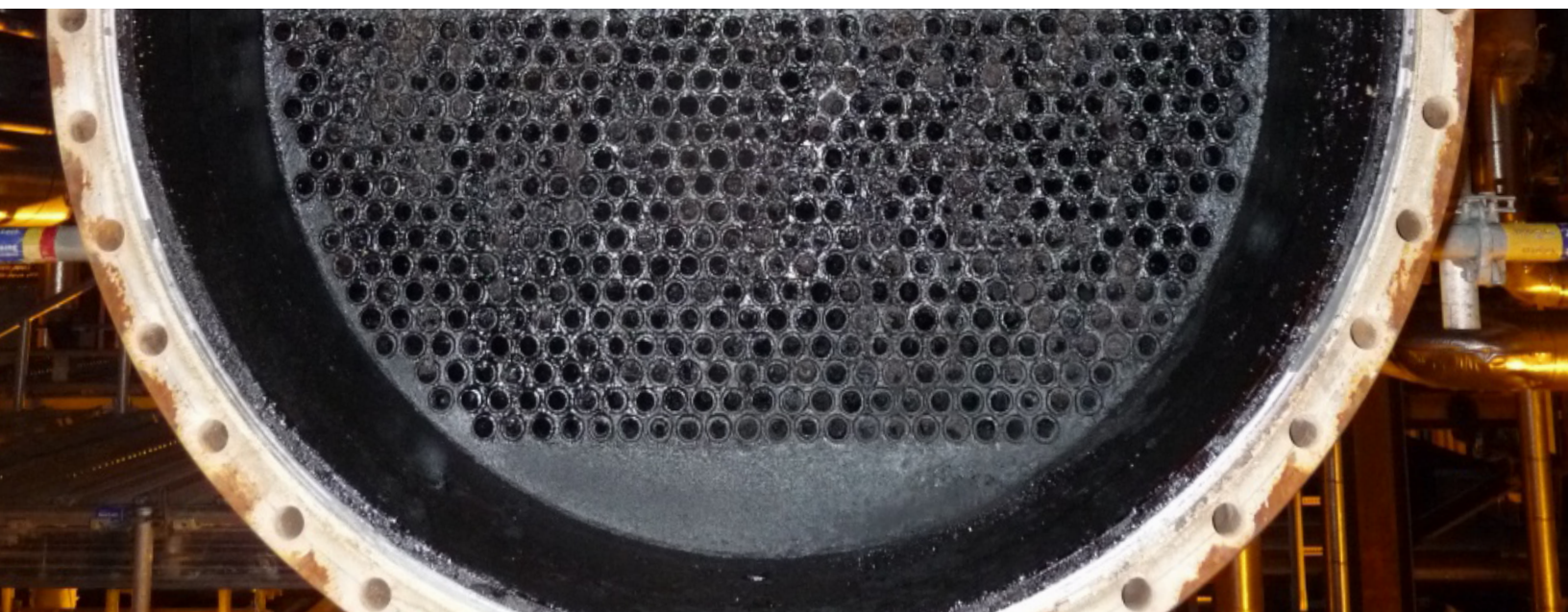
Even with up-front investment to safeguard against fouling-induced downtime, including oversized units and installation of redundant trains, the producer was still juggling flow distribution and frequent cleanings. This process variability created constant challenges downstream, and, to top it all off, assets were facing shorter lifespans from the added wear and tear.

Simply put, the producer's heat exchanger fouling was severe, disruptive and exceedingly expensive to address.

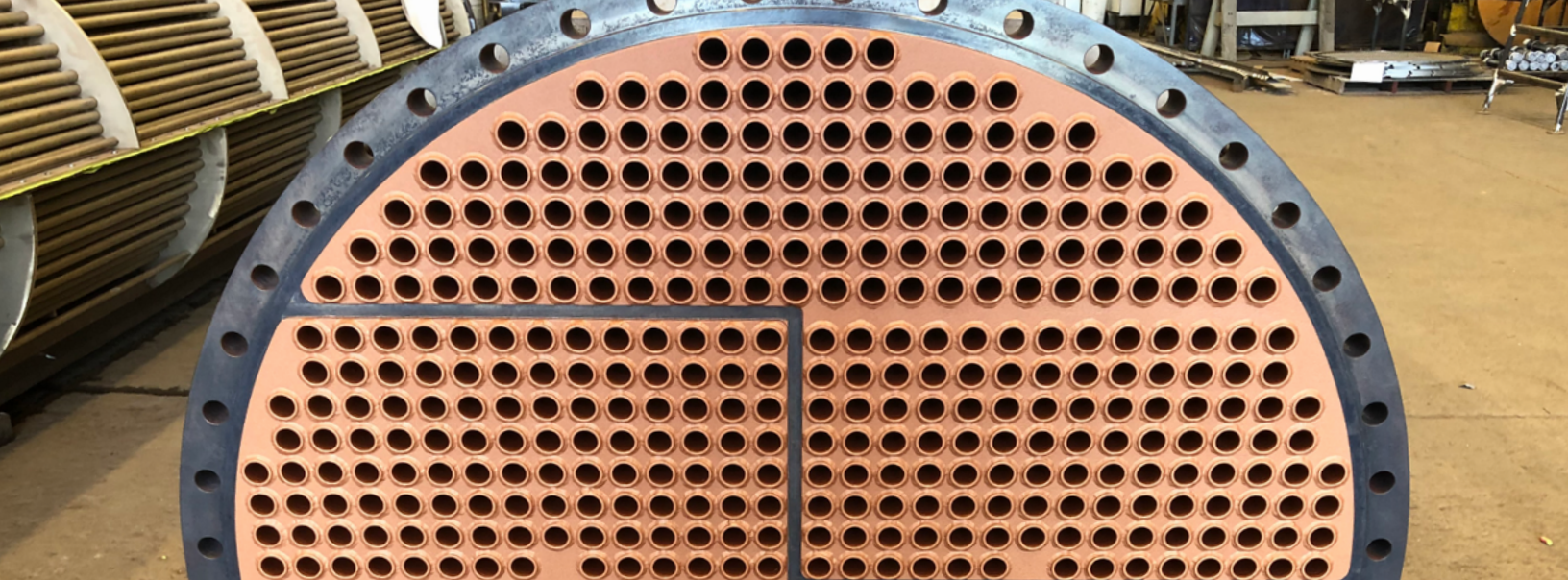
Exploring multiple alternative exchanger designs, clean-in-place (CIP) strategies and cleaning solutions met with little success. The producer began working with one of their trusted suppliers, Exchanger Industries Limited, to evaluate a novel proprietary antifouling coating recently developed for shell & tube heat exchangers.

<sup>1</sup>Fouling in Heat Exchangers, H. Ibrahim, Intech Open 2012;

[https://cdn.intechopen.com/pdfs/39353/InTech-Fouling\\_in\\_heat\\_exchangers.pdf](https://cdn.intechopen.com/pdfs/39353/InTech-Fouling_in_heat_exchangers.pdf)







## A DIRECT FIELD COMPARISON

### Testing Exchanger Industries Limited's coated heat exchanger vs. existing equipment

A world leader with 60 years of heat transfer experience, Exchanger Industries Limited is dedicated to innovation. To address one of the industry's major pain points, Exchanger Industries invested a decade of R&D in close collaboration with a well-known global chemical supplier to produce a breakthrough antifouling coating for heat exchanger tubes.

The oil sands producer wanted to evaluate this new coating directly in the field, at full scale and in real-time, to objectively monitor its performance against existing uncoated exchangers. The producer highlighted their priorities for the trial—the technology had to present a negligible risk for current operations, and it had to show a clear return on investment.


Exchanger Industries was up to the challenge. The first step was to work hand-in-hand with the producer's engineering, operations and development teams to quantify the current financial impact of fouling and establish a baseline for measuring the coating's performance. After all, as great management theorist Peter Drucker once said, "You can't manage what you can't measure."

Then, before testing began, the two companies jointly nailed down targets for the key performance indicators, agreeing that the coated exchanger would have to achieve the following objectives to be considered a success:

- > 50% reduction in cleaning frequency (double the current exchanger uptime)
- > Thermal performance sufficient to eliminate equipment redundancy (greenfield units reduced from 3 to 2)

The producer purchased a large shell & tube produced water cooler with Exchanger Industries' antifouling coating applied tube-side, to compare against their current units. Considering the new heat exchanger's daunting performance targets and the harsh production conditions of the Canadian oil sands, where equipment nameplates routinely cite -50F°, it was the ultimate field test for the antifouling technology.

The technology had to present a negligible risk for current operations, and it had to show a clear return on investment



The Producer recouped 100% of their investment costs within two years, and have since extended the technology to their air-cooled heat exchangers, putting the coating to use at multiple oil sands sites.

## RESULTS & BENEFITS

### Seven years without a single cleaning event

After intensive development efforts, Exchanger Industries successfully supplied the first-of-its-kind coated heat exchanger. The producer installed the full-scale test unit alongside its existing oil sands equipment and the commissioning was seamless, with zero impact to operations. The antifouling-coated unit went into service, and it quickly eclipsed every target set.

**The producer has yet to experience a SINGLE cleaning event on Exchanger Industries Limited's coated heat exchanger, even after seven years of continuous service.**

For the oil sands producer, the results were—and continue to be—tremendous. Seven years with no exchanger cleanings has translated to over \$1,000,000 in direct CIP savings based on pre-trial cleaning frequency and costs.

In addition, the coating's performance through mid-2020 supports the following estimated benefits when applied to greenfield deployments of the technology:

- Elimination of redundant heat exchangers; potential to save millions in total installed capital
- Energy savings from improved thermal efficiency: hundreds of thousands saved annually via reduced fuel and electricity costs
- Approximate doubling of exchanger coated unit life expectancy relative to uncoated units: hundreds of thousands to millions in capital savings depending on equipment specifications

The producer was thrilled with the coated exchanger's performance. They recouped 100% of their investment costs in less than two years, and have since extended the roll-out of the technology to their air-cooled heat exchangers, putting the coating to use at multiple oil sands sites. Given the strong collaborative role the producer played from the outset of development efforts, it's worth highlighting that they intend to showcase the impressive results by publishing a summary of their experience with the antifouling technology via the Canadian Oil Sands Innovation Alliance in the coming months of 2020, so stay tuned!



Want to reduce the impact and costs associated with heavy fouling?

Find out how we combine innovation and heat transfer technology to make it happen.

[CONTACT US](#)



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