



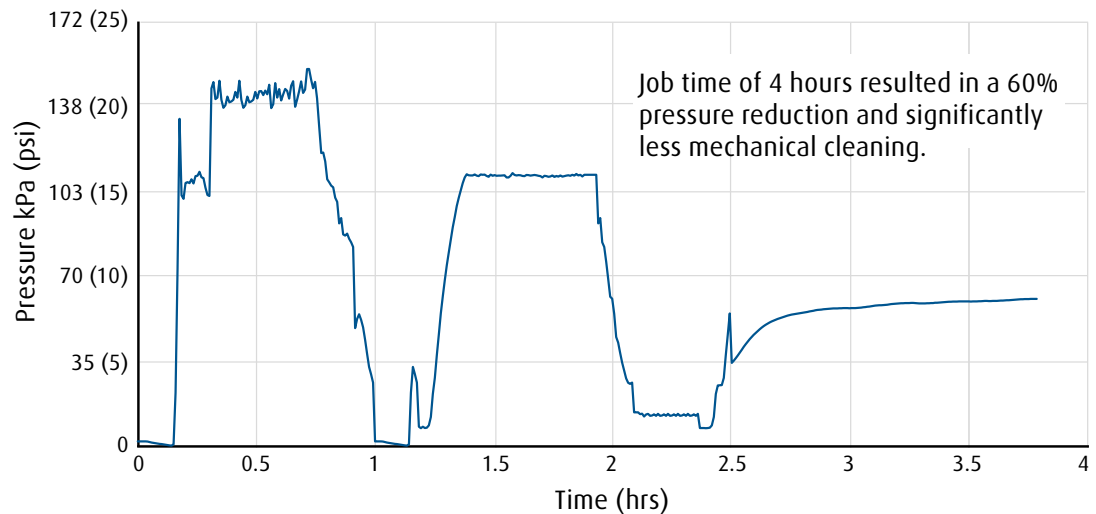
# IN2ERT™ Accelerated Purging and Cleaning Service Mechanical Cleaning – Case Study

**Challenge** A Canadian heavy oil processing facility encountered poor operating heat transfer, significant pressure drop, and a resulting reduced capacity in a pair of sales oil heat exchangers. The cause was a thick and sticky bitumen completely covering the tube bank on the shell side. The hydrocarbon foulant build up led to poor efficiency of the unit. Previous cleanings of these exchanger bundles were done by pulling the tube bundles and subjecting individual bundles to manual cleaning. This was expensive, took several days, and placed individuals in a fugitive emissions environment, leading to elevated safety risks.

**Linde Services Approach** The processing facility employed Linde Services Canada Inc. to use its IN2ERT process to clean the heat exchangers in-situ. In preparation for the job, the heat exchangers were drained of sales oil and isolated. Using nitrogen as a carrier, chemicals were entrained in the gas and injected into the heat exchangers as a mist. Chemicals chosen were green, biodegradable and completely organic degreasing chemicals as a mist, the IN2ERT process solubilized and removed the foulants that adhered themselves to the metallic surfaces, causing reduced efficiency. Additionally, VOC's were absorbed and H<sub>2</sub>S was neutralized during the cleaning process. The nitrogen and toxic gases vent stream were routed to a carbon scrubber provided by Linde Services Canada Inc. to capture any low boiling hydrocarbons.

**Results** The cleaning process was completed in four hours and at the end, the heat exchangers were in a complete inert atmosphere. A 60% reduction in pressure drop was attained – a significant improvement in the operating heat transfer efficiency and substantial removal of almost all foulants, such as asphaltenes as evidenced by the pictures below. After the IN2ERT process, the customer decided not to pursue mechanical cleaning. Comparatively, sister bundles pulled from the same heat exchanger train required 40 hours of total manual cleaning time the IN2ERT cleaning offering unlocks significant time and process efficiencies to customers.

## Heat exchanger cleaning using IN2ERT



**Job time of 4 hours resulted in a 60% ΔP reduction and significantly less mechanical cleaning.**



#### In-Situ Heat Exchanger Cleaning

- Preclean your heat transfer equipment before you pull the bundle
- Lower your power and energy requirements mid-run

#### Onstream Exchanger Cleaning Program

- Hire LSCI to preclean your heat exchangers in place and extend your run length
- Reduce energy consumption between turnarounds by improving heat transfer efficiency
- Improve flow and heat transfer by reducing pressure drop
- Effective in tube side and shell side cleaning

“ IN2ERT cleaning worked great on E-36 A/B. We pulled the sister HX bundles right after this and it was completely covered in thick, sticky emulsion. Comparatively, it was a bad working environment for the crew, and we will spend a lot of time cleaning those bundles.”

– Site Manager

#### Contact Linde today:

To contact Linde and learn more about our services, please visit us at [www.lindecana.ca/services](http://www.lindecana.ca/services), email us at [LSCI@linde.com](mailto:LSCI@linde.com), call in western Canada **866.443.3491** or call in eastern Canada **888.332.4066**.

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