WHITE PAPER

FINFOAM Division Expands Applications for Petrochem and Power Facilities

For years, Thompson Industrial Services has offered FINFOAM, a proprietary cleaning system, to service air-cooled heat exchanger components. This system quickly gained popularity with Thompson's industrial clients due to not only its cleaning power but also its gentle, damage-free treatment of equipment. Furthermore, FINFOAM is a green technology, presenting no environmental concerns and enabling a very quick cleanup process following a project.

Thompson has had lots of success applying the FINFOAM method to a number of other industrial equipment cleaning services. The key properties of FINFOAM make it a powerful asset in not only the cleaning of air-cooled heat exchangers but a number of other types of fin and/or coil based components as well, particularly when traditional methods of water blasting or abrasive-based blasting are not possible. Here is an overview of a few of the ways Thompson is bringing FINFOAM's power and efficiency to new clients and providing more value than ever before.

FINFOAM: What you need to know

Thompson is the single resource for an industrial facility for services ranging from precommissioning to decommissioning and the entire life cycle in between, and FINFOAM comprises an important specialty segment of those services.

The cleaning system is based on the use of a proprietary non-toxic, environmentally friendly foaming agent, which technicians apply to a surface. The foaming agent then encapsulates debris of all types, including dirt and corrosive elements that hinder the efficiency of mechanical equipment during operation. The final step is a rinse phase, in which the foam and encapsulated debris are gently washed out of the equipment. Because the foam and rinse water are completely safe for the environment, cleanup is minimal and the equipment can be brought back online very quickly.

Most Common Application: Refineries

The most common application for FINFOAM, and the one for which it was originally designed, is in the cleaning of air-cooled heat exchanger components. These units depend on the functionality of thousands of small, delicate fins, and an ideal cleaning system must be capable of removing debris and plugging from between these fins without damaging or bending them.

Unfortunately, many of the traditional cleaning options fail in one of these two areas. Applications that are gentle enough to avoid damaging fins fail to completely remove debris, resulting in lingering inefficiencies and reduced life of service for the unit as a whole. On the other hand, applications that blast all debris from the unit leave many fins bent or damaged, which in turn reduce the functionality of heat exchange.

FINFOAM strikes the perfect balance between power and safety for heat exchanger fins, as its foaming agent covers 100% of the surface area and captures all debris, yet the gentle rinse phase uses a low enough water pressure setting to avoid causing damage to delicate fins. The consistent success of this system has made it a favorite among Thompson Industrial Services' clients across the southeastern US, even more so because a typical FINFOAM cleaning is much faster and less disruptive to operations than competing methods.

Expanded Application #1: Petrochem Plants

The simplicity of FINFOAM and its lack of environmental impact make it a great candidate for cleaning tasks beyond the area of air-cooled heat exchangers. As our experts have compared the features and benefits of FINFOAM to challenging cleaning projects that our teams encounter in a variety of industries, several promising opportunities have presented themselves. One of those is cleaning equipment at petrochemical plants, a major service area for Thompson. As the following case study illustrates, FINFOAM has incredible potential for uncovering unexpected cost savings and improving efficiencies in this field.

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Case Study: Furnace Convection Section

1. Client Problem

The client contacted us to request help cleaning the convection section of an ethylene cracking furnace. The equipment was nearly 20 years old, and its decreasing performance had moved beyond acceptable levels. Issues included:

- Failure to reach excess target oxygen levels of 2.5% to 3%
- Near-inability to maintain negative crossover pressures
- Significantly reduced feed rates due to poor performance

Inspections, tests, and analysis revealed that the convection section suffered from inefficiency due to heavy contamination of the fins on the convection tubes.

Our client asked our team to do whatever we could to clean the fins, hoping to improve performance enough to get by until the entire convection system could be replaced--a step that the facility's managers had concluded would be necessary given the age and decreased performance rates of the unit.

2. Cleaning Strategy

The Thompson team's strategy for cleaning the convection tubes was complicated by restricted access issues. Blasting every surface with water, abrasives, or even high-pressure air was not possible without major changes to the environment, including cutting temporary access doors. In the end, our experts determined FINFOAM to be the ideal method of encapsulating the debris between the fins and pulling it all to the floor to be safely vacuumed and removed.

Because a water rinse is needed to complete the FINFOAM cleaning process, the team needed to carefully consider the areas of the furnace that could not be impacted by water and seal those areas off. Technicians installed a flex hose to the convection section's inspection port, which routed the rinsed foam, waste water, and debris to dedicated frac tanks outside the building. Once the risks were mitigated, our team applied the FINFOAM foaming agent, rinsed,

and repeated the process until the rinse water was visibly clean--a process that takes just four to six hours.

3. Significant Improvement

When the unit had been completely cleaned and put back into service, the reports on excess oxygen and draft pressure indicated that the convection section's performance was dramatically higher than it had been before the FINFOAM cleaning process:

- Excess oxygen levels consistently exceeded target capacity
- Draft pressure control problems were resolved and negative crossover pressures were easily maintained during operation
- Furnace stack temperatures decreased by 10 degrees Fahrenheit due to the cleaning project
- Fuel efficiency increased by 5% immediately, with a long-term sustained improvement of 2.5%

The client was very pleased with the performance improvements, and the facility's managers reversed their decision to replace the convection section as soon as possible. With the consistent performance at target levels made possible by the cleaning of the convection tubes, it was determined that the unit, despite its age, was capable of a longer service life than had been suggested. This advantage represented a significant cost savings for the plant, in addition to the immediate efficiency benefits.

Expanded Application #2: Power Generation Facilities

The other exciting area where Thompson's FINFOAM division is making news is in the cleaning of the air side of air-cooled condensers in power generation plants. As with air-cooled heat exchanger components, the fins that are integral to the functioning of these condensers are vulnerable to damage under high-pressure water blasting (the traditional method of cleaning). By using FINFOAM instead, followed by a gentle rinse, our teams have achieved incredible

results for power generation clients. An added benefit of FINFOAM over water blasting is that the foaming agent is far more effective in capturing and removing grease and oil that may have leached into the unit from gear boxes.

Mini Case Study: Central Florida Utility

- Variable frequency drive high temperatures:
  - Before FINFOAM cleaning: 411 degrees
  - After cleaning: 392 degrees
- Variable frequency drive capacity:
  - Before FINFOAM cleaning: 100%
  - After cleaning: 94%

FINFOAM Advantages: Automation, Safety, Environmental

One of the most exciting developments within our FINFOAM department in recent years, and one that played a particularly important role in the petrochemical plant furnace convection section cleaning, has been the combination of the system with our automated positioning equipment. Our automated tooling made it possible to apply the foaming agent to convection tubes in an area where it was impossible for a human technician to safely enter. Within the standard application of FINFOAM for air-cooled heat exchanger cleaning, automation often allows our teams to clean equipment without ever taking it offline--that means zero downtime or lost production.

As with all of our automated services across the Thompson Industrial Services divisions, having our technicians control tooling remotely keeps them at a safe distance from operating equipment, out of confined entry spaces, and gives them a comprehensive view of the project, aided by specialized software. This high degree of safety on the job is a top priority for Thompson and drives our efforts to pursue 100% automation.

The non-toxic, environmentally safe nature of FINFOAM is more than just a “green” benefit for the ecosystem, as important as that is. It also makes it possible to use the system in challenging

environments where the introduction of chemical cleaning solutions is prohibited. This was a major factor in our petrochem plant success story, and we anticipate offering FINFOAM as an ideal solution for many other difficult equipment cleaning tasks.

FINFOAM and Continued Innovation

As exciting as the FINFOAM story is, it's just one example of the great things happening at Thompson Industrial Services. Our outage management teams and automation experts are always considering new ideas for applying our automation, customized tooling, and other specialized equipment to our clients' most difficult problems. We look forward to meeting you and introducing what FINFOAM and our other service offerings can do for your plant.