

TARGETED IN-FURNACE INJECTION (TIFI)



**For Superior
Control of**

SLAGGING

FOULING

CORROSION

ACID PLUME


FUEL TECH[®]
Technology for a renewed environment™

The Problem: Slagging and Fouling

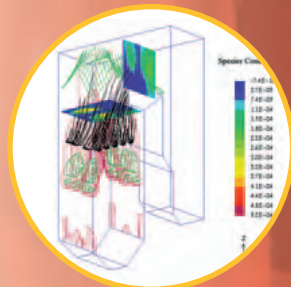
As slag deposits grow, your boiler can suffer:

- loss of heat transfer as indicated by falling superheater steam temperatures and increasing stack temperatures
- increased fuel usage to maintain steam temperatures
- restricted air flows leading to increasing draft losses, higher gas velocities, tube erosion, and eventual tube failure
- formation of large clinkers that fall and damage boiler furnace floor tubes

The TIFI Total Program Solution

Sophisticated CFD Modeling

The true backbone of Fuel Tech's program is our world-class modeling ability. We have the tools and the experience to "see" into your furnace and very accurately map injection and dosage to solve your slag problems.



Proprietary Reagents

Fuel Tech's TIFI proprietary reagents are specially stabilized chemical slurries with high reactive ability due to a large surface area per unit weight ratio. This high activity results in reduced treatment dosages while their stability eliminates many of the handling and feeding problems associated with unstabilized compounds.



Chemical Feed Systems

TIFI Program Equipment provides customers with a customized, well-engineered and reliable means for treating combustion units. The Program Equipment includes state-of-the-art injectors, automated chemical feed systems, water boost pumps and chemical circulation module. During the design phase of the Program, Fuel Tech will provide engineering and electrical schematics of the Fuel Tech supplied equipment.



Experienced Technical Support and System Monitoring

Fuel Tech has highly trained and dedicated local sales and service teams to monitor your program performance. It is our goal to always demonstrate a clear financial return for your investment with our company.



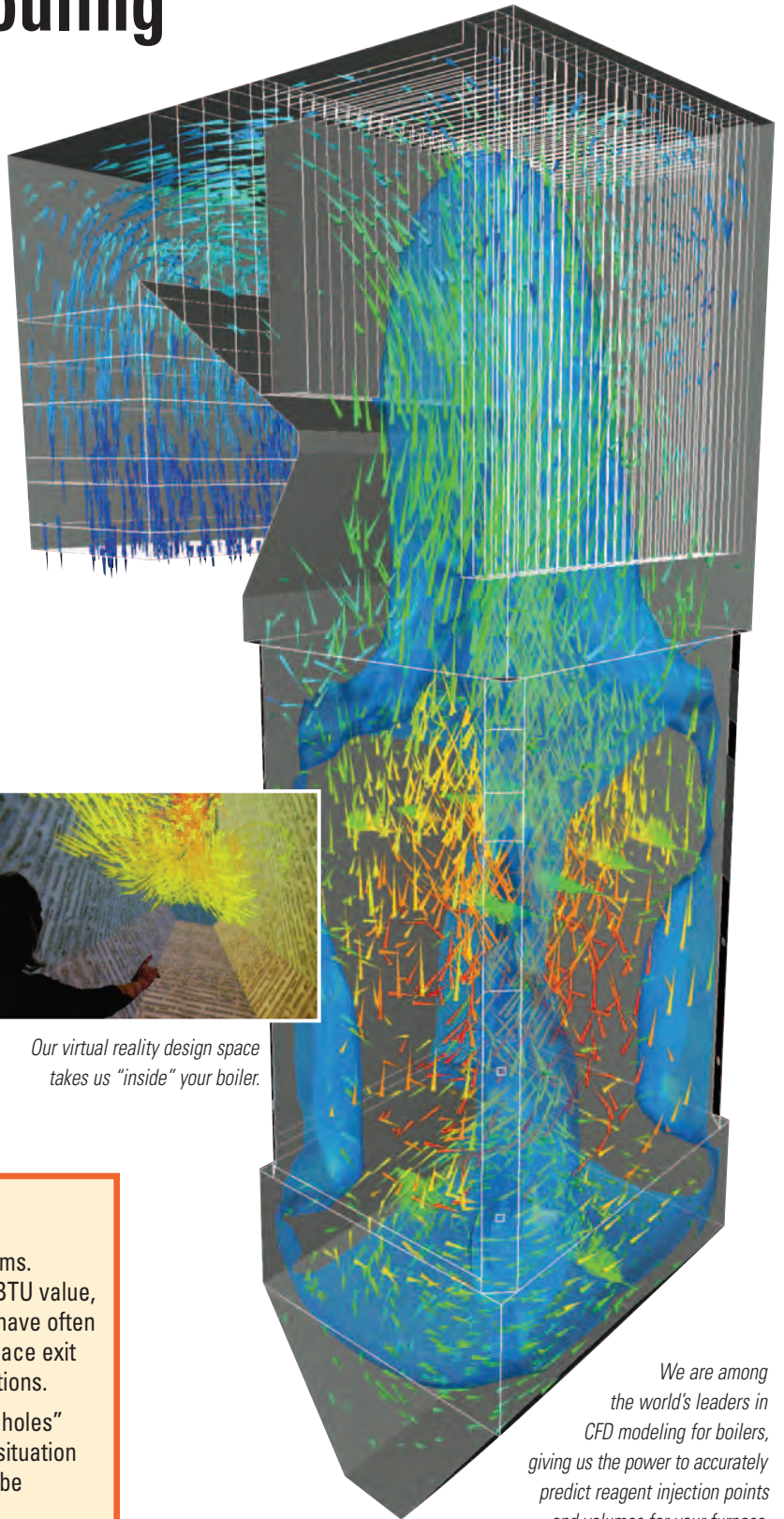
Targeted In-Furnace Injection (TIFI) to Control Slagging & Fouling

Targeted for Optimal Performance and Cost Effectiveness

Fuel Tech's patented Targeted-In-Furnace Injection program can increase capacity, control lost production and decrease the cost of running your boiler. Whether you are firing a utility boiler with western coal, oil, or operating a recovery boiler, kiln or Waste-to-Energy plant, TIFI will reduce slagging and fouling while providing a host of related benefits.

Our Unique Insight Into Your Furnace is the Key

Targeting works because it directs the right amount of chemical reagent to the right location. Fuel Tech's abilities in Computational Fluid Dynamics (CFD) and heat transfer modeling are highly sophisticated. Using both commercial and proprietary CFD modeling tools and our unique virtual reality design space, we recreate your boiler as a "virtual furnace" and design injection and dosage maps to reach 100% of your furnace's problem zone.



Our virtual reality design space takes us "inside" your boiler.

We are among the world's leaders in CFD modeling for boilers, giving us the power to accurately predict reagent injection points and volumes for your furnace.

Ideal for Western Coals

The shift to compliance coals has created new slagging problems. Specifically, Powder River Basin (PRB) coals, with their lower BTU value, higher inherent moisture and different burning characteristics have often supported fouling of lower water walls, which in turn raise furnace exit gas temperatures and fouling in the convection and platen sections.

As these deposits grow, they restrict gas passes and form "rat holes" that experience five to seven times design gas velocities. This situation leads to increased fan vibration / RPM's, erosion of unfouled tube surfaces, more frequent cleanings and capacity problems.

TIFI allows more than 90% of the reagent chemical to be aimed right at the problem areas, with minimal waste as compared with generalized fuel-side chemicals. Less waste, more control... TIFI delivers the best result for PRB fuels.

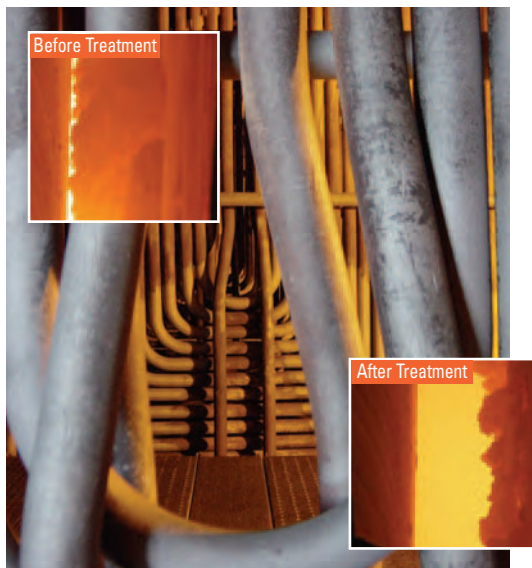
For Oil Burners, MSW Boilers, Kilns and WTE Boilers, too

The TIFI process has shown great success in non-coal applications. The principle difference for oil-fired furnaces is that a "hybrid feed" system is employed so that reagent is added to the fuel as well as injected into the targeted areas designated by our comprehensive modeling efforts.

What's the Benefit?

By targeting the radiant and convection areas of your furnace with slagging or fouling problems, you'll use less reagent to get more accomplished. Specifically, you'll:

- Maximize your boiler's performance by inhibiting slag formation in superheaters, reheat and furnace wall sections.
- Improve your boiler's reliability with a customized chemical and feed system that automatically addresses your toughest slagging problems.
- Relax, knowing that a proven service program supported by Fuel Tech Service Technicians is monitoring your furnace's performance.



Seeing is believing. During normal shut down periods the results of chemical treatment can be easily observed. What normally takes days or even weeks to clean is cleaned in hours. The small "inset pictures" are infrared snapshots before treatment and after treatment.

How Does It Work?

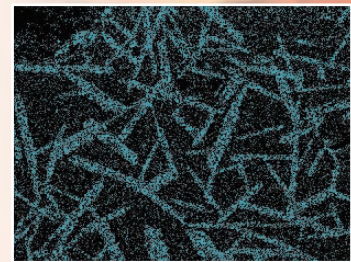
Fuel Tech will create a customized injection program for your furnace to guarantee high chemical activity in multiple locations at the same time. But, what exactly is going on when our reagent penetrates slag deposits?

In short, Fuel Tech's proprietary chemicals alter the physical crystal characteristics of the slag as it adheres to the tube surfaces. Crystal strength is reduced, which allows sootblowing to easily remove the deposits. Ash fusion temperatures are increased, effectively breaking the grip of ash.

Untreated Slag

113 X magnification

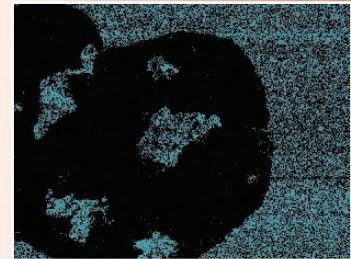
Untreated slag removed from boiler firing western coal. Sample is color enhanced (blue) to indicate aluminum "fiber" structure.



Treated Slag

113 X magnification

TIFI-treated slag. Microstructure shows aluminum fibers have disappeared, reducing the structural integrity and strength of the slag.



SO₂ Mitigation in Coal and Oil-Fired Utility Boilers

The TIFI technology has also been developed to control SO₂, acid blue plume, stack opacity (caused by sulfuric acid) and air preheater fouling caused by these conditions. TIFI allows the combustion unit to run below dewpoint without problems.

Business Card Here

Let's Talk About Payback!

The projected ROI for Fuel Tech's TIFI process is affected by its many benefits. To calculate your ROI, we can help you factor in:

- Proven slag and corrosion inhibitor
- Allows for fuel flexibility (use more contaminated fuels)
- Increase in overall combustion unit reliability
- Extended unit run time
- No interruptions in base-loaded operation related to slag or fouling
- Savings through greater heat transfer cleanliness
- Elimination of large clinkers and associated tube damage (and danger)
- Overall cleaning cost reductions
- Increase ash pH, to extend life of air preheater and seals
- NO_x reduction (10-15%)
- Savings associated with reduction in soot blowing intensity or frequency
- Better control of Furnace Exit Gas Temperature (FEGT)
- Water cannon/lance reduction
- Improved Heat Rate (300 BTU/MW-hr)
- Reduction in Economizer exit gas temperature
- Most cost effective fuel additive program without compromising results
- SO₃ mitigation for a cleaner stack and air preheater throughout ozone season and longer basket life in air preheater (APH).



Over the years, boiler operators have attempted many fireside treatment programs to remedy problems associated with fuel contaminants. Success was often unpredictable. This was many times attributable to misapplication, rather than to chemistry problems.

Now, Fuel Tech has radically changed the way fireside treatment chemicals are applied, bringing effective techniques to a wide range of applications. By employing advanced computer modeling power, we can target in-furnace injection for maximum effectiveness.

Our technology has been proven highly effective in combustion systems burning a variety of fuels, including: eastern and western coal burners, No. 6 residual fuel oil for boilers, furnaces and turbines, black liquor recovery boilers in pulp and paper mills, municipal waste combustors and refuse-derived fuel, hog fuel and biomass burners.



Fuel Tech, Inc., 512 Kingsland Drive, Batavia, IL 60510

Toll Free 800.666.9688 **Phone** 630.845.4500 **Fax** 630.845.4501

www.fueltechnv.com webmaster@fueltechnv.com