

When the heat is on, preparation is everything.

KLAY EnerSol orchestrates a nimble furnace turnaround
using 3M™ Nextel™ Textiles



A specialist in industrial insulation and corrosion abatement solutions, KLAY EnerSol works with their customer to identify the best materials and installation strategy for the fastest furnace turnaround. A natural fit for the task is the Advanced Materials Division of 3M, whose woven 3M™ Nextel™ Ceramic Textiles provides customers with excellent flexibility and heat tolerance for the prefabrication process.

When it comes to the rigorous demands of manufacturing, operational downtime is tremendously disruptive both to the supply chain as well for profitability. Furnace uptime is critical, but furnaces require regular turnaround every 3-5 years, during which key equipment must undergo planned maintenance or replacement.

One of KLAY EnerSol's customers was experiencing secondary cracking in their Catalytic Propane Dehydrogenation (PDH) process heater. A detailed analysis determined the cause to be higher radiant heat flux in specific regions of the furnace.

A solution to the problem needed to address two critical issues: reduction in secondary cracking, as well as minimizing furnace downtime during application.



Challenge

Industry solutions to address secondary cracking in furnace tubes do not work well and turnaround takes minimum of 3-4 weeks



Solution

Reduce secondary cracking with high temperature insulation and use pre-fabricatable material for quick turnarounds



Insight

Prefabrication of material can help reduce turnaround time to a couple days



Why 3M™ Nextel™ Ceramic Textiles

Provides customers with excellent flexibility and heat tolerance in the prefabrication process



Industry

Industrial Insulation
Selangor, Malaysia

“Because of our strong relationship with the technical team and 3M as well, we are able to regularly draw upon their deep understanding, know-how and knowledge of the product to develop a robust solution for our customer.”

Yunus Sajad Hussein,
KLAY EnerSol CEO and Founder



CEO and Founder) states, “Because of our strong relationship with the technical team and 3M as well, we are able to regularly draw upon their deep understanding, know-how and knowledge of the product to develop a robust solution for our customer.”

The specific product chosen by KLAY EnerSol for this project was 3M™ Nextel™ AF-20, a 312 grade Ceramic Fabric, for both its temperature resistance and cost-effectiveness. It met their customer’s application needs and, more critically, could be fully prefabricated. This final point allowed for a fast installation conforming to the irregular shapes within the furnace, requiring less costly labor and operational downtime.

Other alternatives were considered and discarded: silica cloth had a lower price point, but lacked sufficient mechanical strength and long-term reliability; rigid refractory materials offered temperature resistance and mechanical strength, but were completely inflexible and would need metal studs to be welded onto the tubes which was a major risk; and non-woven ceramic fibers were not durable enough to withstand the furnace conditions.

Once KLAY EnerSol identified 3M™ Nextel™ AF-20 Ceramic Fabric as the optimal solution, plans were set in motion to build prefabricated heat shields for the tubes. The prefabrication process, which took two months and included trials and mockups, proved to be a great time-saving solution for KLAY EnerSol’s customer. The careful planning and preparation between KLAY EnerSol, 3M and the customer enabled an installation time of only two and a half days. Yunus Sajad Hussein detailed the time savings: “Any other conventional system would have taken (the customer) three to four weeks minimum, plus other associated risks with the application. Knowing that we were able to complete the job in a very short amount of time gave them the flexibility and the ability to still execute a project without affecting their overall schedule.”

The industry expertise provided by KLAY EnerSol, together with 3M’s technical capabilities, resulted in a project outcome that far surpassed their customer’s requirements and expectations. As planned, the prefabrication and planning enabled fast delivery and installation, helping the customer avoid additional expensive downtime – where daily losses for this type of plant can range between \$150,000 and \$250,000. The performance of the 3M™ Nextel™ Ceramic Textile insulation also helped improve the customer’s overall process yield, reducing secondary cracking by 8–30%, all without inhibiting primary cracking.

With the solution in place, and a standing collaboration with two experts within the industry, the plant has set themselves up for future success.

In addition to minimizing operational downtime, the physical design and age of the tubes within the furnace presented further challenges. The tubes had protrusions in the support brackets as well as thermocouples that made wrapping around them more complex and the age of the tubes meant that no welding or hot work was possible without compromising the integrity of the aged tubes. The confined work area also limited the number of personnel able to work inside the furnace. To solve these design challenges, KLAY EnerSol looked for a high-temperature insulator and radiant heat reflector to apply directly onto the tubes that was flexible for the prefabrication process.

After evaluating the options, 3M™ Nextel™ Ceramic Textiles were selected by KLAY EnerSol for their combination of high temperature resistance, flexibility, and proven track record. Nextel™ 312 fabrics retain flexibility and dimensional stability at continuous temperatures up to 2192°F (1200°C).

When asked about the collaborative effort to choose the right material, Yunus Sajad Hussein (KLAY EnerSol



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