

Five Tips for Achieving Furnace Lining Efficiency

By Steve Chernack, Morgan Advanced Materials



An efficient furnace lining is key to reducing overall maintenance costs and ensuring that facilities run smoothly without undue revenue loss due to downtime. Follow the five tips below to keep your furnace lining running efficiently.

Tip 1 – Evaluate the furnace liner by using infrared (IR) thermography inspection

Infrared (IR) thermography scans are an essential step for evaluating the quality of the furnace lining. Lining quality is critical to protecting the steel from heat and to limiting heat loss and promoting overall furnace efficiency. Typically, the scan involves pointing an IR camera at several points on the furnace casing to analyze the outside temperature and identify hot spots where the unit is leaking heat or experiencing design issues that may not be visible from the outside. This is an issue with a painted surface.

Obviously, scanning from the outside is of great benefit, because the unit can continue to operate. **Figure 1** shows an IR camera detecting hot spots or other problems with the lining. In many cases, specially trained applications engineers conduct the infrared imaging, analyze the IR scans, and provide

recommendations on the most appropriate repair options.

Tip 2– Use on-line maintenance repair

Depending upon the temperature, the difficulty of getting to an area, or how big the hot spot is, conduct on-line repairs wherever possible. Most maintenance managers prefer the on-line repair option because it is reliable, fast, and economical. After all, boilers and process units are generating revenue, so it is of great value if repairs can be made while the unit is online. This avoids revenue loss from the unit in question, as well as the consequential losses from shutting down additional connected units.

For example, where IR scans indicate that on-line repairs are recommended, our Thermal Ceramics' pumpable Superwool® or Kaowool® can be pumped from the outside of the furnace or boiler, filling cracks and voids caused by deteriorated insulation. These products are ideal for providing improved thermal insulation efficiencies behind boiler tubes in sidewalls, seals and floors as well as repairs of ovens, furnaces and process equipment.

With traditional repairs, the furnace must be shut down and cooled until it is safe for maintenance personnel to enter and repair the lining with fibre blankets, pumpables or monolithics.

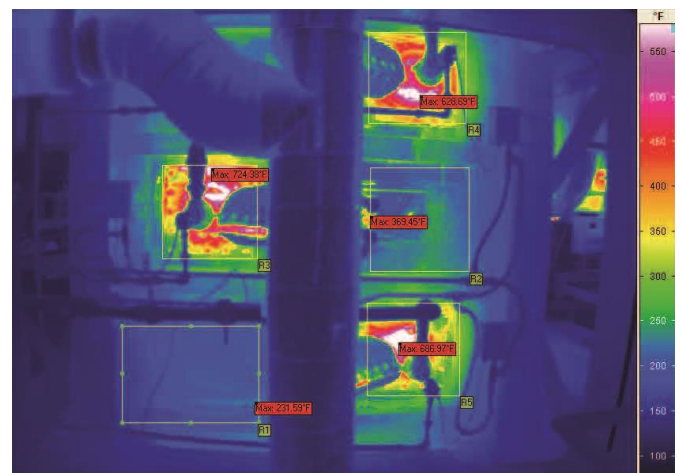


Figure 1 Infrared (IR) Scan showing hot spots

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Figure 2 shows how the repair materials can be pumped in from the outside to fill the hot spot and cool a particular area.

Figure 2 Installing Pumpable into the hot spot while furnace remains online

Tip 3 – Choose the right material for furnace re-builds

When IR scans indicate that the area of concern is too large for on-line repairs, the unit must be shut down for a furnace reline or process heater reline. Material selection is key to a successful furnace rebuild that will improve efficiency and reliability and lower maintenance costs. Material properties, including hardness, density, mechanical resistance, or insulating factor, may vary depending upon the furnace's application. Selection of the proper material is frequently done by using a heat flow analysis software program in which temperature and use factors are inputted to obtain information on the best materials to be used.

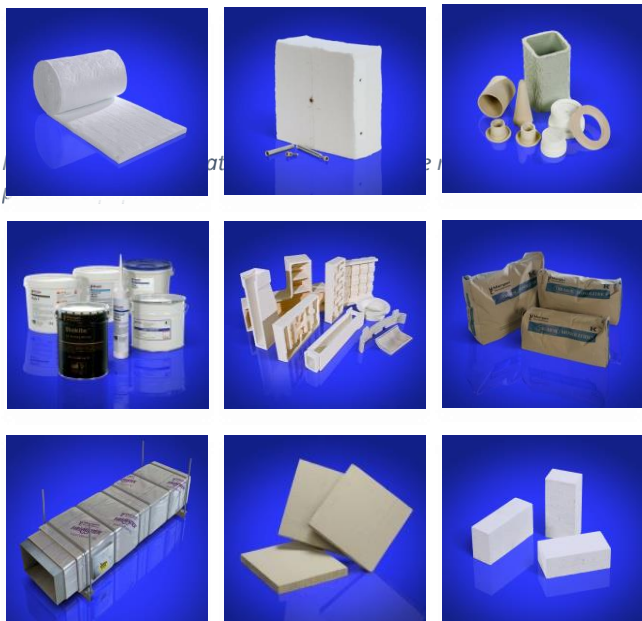


Figure 3 Variety of materials used in furnace rebuilds and process equipment

important to ensuring that the furnace relining is as long-lasting as possible. Make sure the materials have enough studs to hold them in place and have sufficient joints for expansion or shrinkage. For instance, if you install a brick

Keep in mind that many units have old style insulation; since there are so many new, more efficient insulation types now on the market, consider upgrading when you have to reline the furnace. For example, our Thermal Ceramics' Superwool[®] Plus fibre has up to 20 percent lower thermal conductivity than competitive insulations. As a result Superwool Plus fibre is 17 percent more energy efficient than traditional Refractory Ceramic Fibre (RCF) and any other Alkaline Earth Silicate (AES) insulations. A breakthrough in the company's advanced manufacturing control has allowed the product to be engineered to maximize the fibre content. Its low bio-persistence also makes it a good replacement for those looking to move away from RCF insulation.

Tip 4 – Carefully consider engineering design

After selecting the proper materials, be sure that the engineering design is suitable. Engineering is extremely

important to ensuring that the furnace relining is as long-lasting as possible. Make sure the materials have enough studs to hold them in place and have sufficient joints for expansion or shrinkage. For instance, if you install a brick

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lining without the proper expansion joints, the brick could grow and end up pushing the entire lining off the furnace wall.

Tip 5 – Proper installation is key to success

Be sure that installation of furnace lining material is done properly and those doing the job have the proper skills for the task. There are a wide variety of products available and each one has different installation requirements. For example, with concrete products, if the concrete is not mixed with the right amount of water at the proper temperature, the material will not develop, will be difficult to place and will not reach expected properties. The bottom line is that if you don't install it right, it is as bad as not having a good design and not making a good material choice.