EMBRACING INDUSTRY CHANGE

Recent advances in burner technologies commonly incorporate ceramic-based components designed to combine higher heat flux capacity, longer component life, higher efficiency, and reduced emissions. (Courtesy: INEX Inc.)

When it comes to thermal-processing methods, accepting innovative improvements is often the key to ushering in the next wave of advancements.

By MICHAEL RUMFOLA

Most companies, regardless of the industry or business, want to see improvement. Whether it is improving customer satisfaction or quality or bottom-line profit or reputation in the community, the common denominator is the same. In order to achieve this common goal, something or perhaps many things have to change. However, as soon as the realization is made that something must change in order to improve, we have a general and innate tendency to run into misoneism. Before you run for your Webster's Collegiate Dictionary or Google it, it means: "a hatred, fear, or intolerance of innovation or change."

Today, in 2020, the horseless carriage, automobile, is a prime example of embracing change. Henry Ford, Boss Kettering, and the Dodge Brothers could never have dreamed of what today's cars, trucks, and SUVs are capable of. At present day, the automobile industry is literally on the cusp of autonomous vehicles. Every car or truck produced today, regardless of manufacturer, has many orders of magnitude more computer power than was aboard the Apollo missions to the moon.

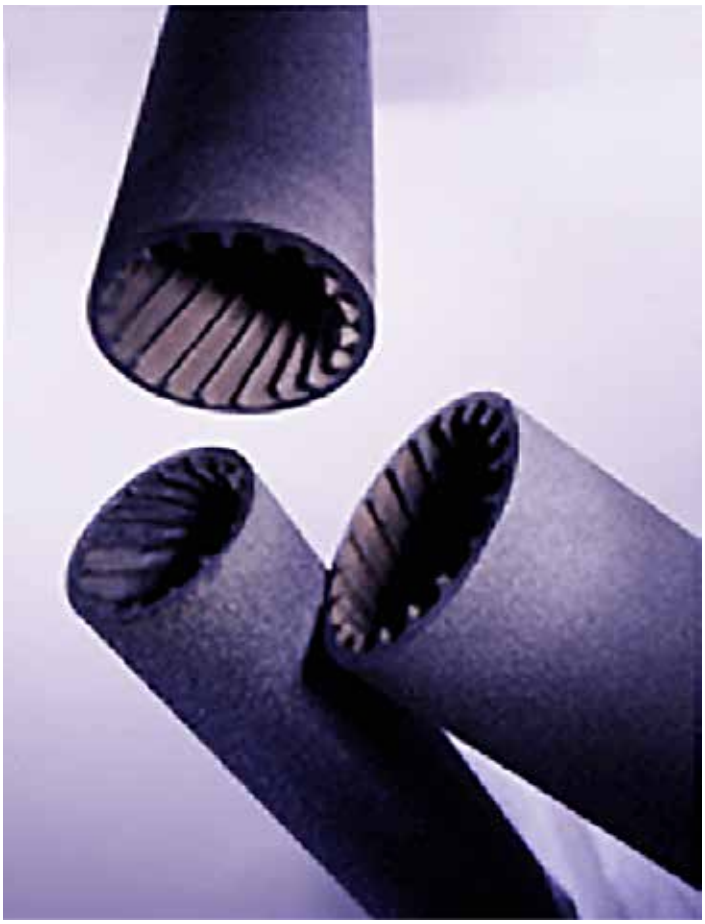
Today, a car's engine has the capability to adapt to different driving conditions and performance requirements. Braking systems automatically adjust to different road conditions. The interior climate controls adapt to desert heat or arctic cold to maintain a stable and suitable cabin environment to provide passenger comfort. Even the steering systems adapt to the vehicle speed and terrain. As with the industry that replaced the horse and buggy, there is no end in sight to changes possible with new technologies, materials, and processes. Of course, the same could be said about the aircraft industry, agriculture, food processing — the list goes on.

HEAT-TREAT CHANGES

Similarly, big changes have been evolving in the thermal-processing industry as well.

Two notable areas are insulation and controls. Gone are the days of asbestos, but advances in ceramic fiber have led to an entirely new wave of ways to keep the heat where it is desired and away from where it is not. Modern furnaces and kilns often combine traditional fire brick with panels or battens of fiber for optimum results at a minimum cost. These advanced materials for walls and roofs have benefited not only the processes but the environment outside the chamber as well.

Whole books could be written about the recent advances in process controls. Many of those advances have only been possible because the "brains" of the controller are so much more powerful. Algorithms in these systems automatically adapt to changing conditions and make adjustments accordingly, almost instantaneously. Advanced combustion systems offer precise control of temperature in an extremely uniform manner. The same is true for controlling the atmosphere inside furnaces. In both cases, adapting new sensor technologies has driven process optimization to where it is today.



Some notable changes in the evolving thermal-processing industry include insulation and controls. (Courtesy: INEX Inc.)

BE OPEN TO NEW PROCESSES

When it comes to traditional thermal processes intricately associated with producing high-quality precision products, the resistance to change is often immense. We are all familiar with several slogans that support a reluctance or resistance to change: "What works – works," "if it isn't broke – don't fix it," "don't mess with the process."

At the same time, we know that embracing change is what we must do if improvements are to be made and a leadership position in the industry is to be achieved or maintained. Improving, for example, the thermal efficiency of a process or increasing the output of a furnace or kiln often requires breaking away from the old ways of thinking and adopting new technologies, materials, and — most importantly — mindsets.

ADVANCES IN BURNER TECHNOLOGY

Recent advances in burner technologies commonly incorporate

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ceramic-based components designed to combine higher heat flux capacity, longer component life, higher efficiency, and reduced emissions. All domestic and international burner companies now offer integral heat exchangers to provide pre-heated combustion air to improve efficiency. Some of these advanced burners require complex geometries and material substitutions in order to achieve the combination of desired improvements.

Silicon carbide components have found wide acceptance in these advanced systems specifically because of their ability to handle higher temperatures, and that capability, in turn, means that higher heat fluxes can be achieved.

Higher heat flux means that shorter cycles in batch furnaces are possible, and with continuous furnaces, faster belt speeds and increased product throughput can be achieved. In both cases, it's a simple concept: more work in a shorter period of time. Of course, this is only possible if new materials or changes, if you will, are embraced.

3D PRINTING

Many of these new components are reliant on new processes such as 3D printing, which makes it possible to produce geometries that could not be achieved with prior traditional methods. Relatively exotic heat exchanger segments of advanced burner systems are now possible and provide additional and enhanced surfaces and improved air movement or turbulence.

Silicon carbide radiant tubes with internal fins are yet another example of combining new, superior materials with new processes to achieve unprecedented improvements in efficiency and emissions reductions. These recent improvements in combustion technology have produced extremely favorable results. Some of these changes have required sophisticated employment of computational fluid dynamics (CFD).

ADVANCED SOFTWARE

The development and widespread use of powerful, high speed computers and advanced software programs have allowed these space-aged tools to become commonplace within the industrial community. Again, the significance here is that all of these improvements in materials, processes, systems, and performance were only made possible by forward thinkers embracing change.

Bottom line: Embrace change. Avoid misoneism, and reap the benefits.

ABOUT THE AUTHOR

Michael Rumfola is the president and owner of INEX Inc. He has a B.S. in physics and a B.S. in mechanical engineering. Rumfola has 25 years of experience in industrial and commercial heat-transfer industries. Born and raised, he's a lifetime resident of western New York. For more information, go to www.INEXinc.net.