IR underused, not understood

Patrick Raleigh gets into heated discussion with infrared industry expert

Frank Wilson

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"I WANT TO GO INTO EVERY UNIVERSITY IN THE world and give a right roasting to whoever is responsible for the study of infrared (IR) technology," declares Frank Wilson, MD of Ceramicx, a Cork, Ireland-based supplier of IR equipment. "Because they are absolutely not giving any information about it."

Wilson's comments reflect a frustration with the lack of understanding of IR as a heating technology among process, chemical, mechanical and, even, electrical engineers. The knowledge gap, he believes, leads to the misuse of the equipment and much subsequent expense in terms of wasted energy, excessive running costs and high capital spending.

The essence of IR heating involves what Wilson describes as a 'Holy Trinity' of three factors – absorption; transmission and reflection: "IR products; have to generate a source temp to generate an IR wavelength, take care of – emissivity – the ability to transfer that energy to a target material – and ensure that the electrical input is transferred to IR output in a very efficient and comprehensive manner, and then to control it.

Another important aspect is the ability of the equipment to deliver a spread of wavelengths that match the spectral absorption characteristics of the material being heated.

Destroy dioxins

Wilson cites, for example, the use of IR in emissions treatment, where it is possible to change the wavelength within the process to produce an ideal hit on an atomic structure. This vibrates the molecular bonds, thereby maintaining the temperature above the critical destruction level of, for instance, dioxins.

The process might, typically, use a quartz glass outer tube to contain the gas, and a ceramic inner tube to absorb the short wavelength transmitted by the quartz tube. This is then readmitted at a lower source temperature resulting in the gas being bombarded with a high intensity of broad bandwidth IR output that matches the IR spectral emission of the gas.

By contrast, a high-speed printing line requires extremely high evaporation rates. This, said Wilson, would typically call for the use of a twin-type IR heater: a short wave one for evaporation, and one with a medium wave output to cure the ink.

"IR is like a toolbox, but unfortunately engineering departments don't understand it, continued the Ceramicx MD. "They say 'we'll do the maths on this', work out the required thermal energy input, convert that from ambient temperature to 300°C, and come up with a figure. But that is only a very small part of the calculation."

Infrared heating offers sophisticated process options – many more than most engineers currently realise

Despite this prevailing 'ignorance' about IR, since its setup in 1992, Ceramicx has made significant inroads in its markets: the 40-employee manufacturer supplying IR ovens, infrared heating solutions, ceramic heaters and thermoforming machinery components to in the process and packaging sectors in – at the latest count – 62 countries around the world.

But for every success, such as a recent order to supply 100 1MW ovens for a major Scandinavian alumina processor, Wilson sees more missed opportunities because engineers at the prospective client company knew little or nothing about IR.

The Ceramicx boss, for example, cites a major Swiss pharmaceutical company that uses a drum heater to dry ingredients. The company, claims Wilson, lacked the engineers to even consider IR, even though it was losing Euro5 million a year on the process as the dryer was not doing the job properly.

Food processors, meanwhile, are missing out on opportunities to enhance the performance of their operations, by more closely looking at the type of 'heat recipe' they apply, Wilson went on to suggest. He also saw potential for much greater use of IR in the chemical industry: for example allowing selective heating of components in reaction vessels to optimise reactions.

"You can reflect IR, direct it, actually put it through materials or have it absorbed or reflected by materials," concluded Wilson. "It is an incredible toolbag of energy that you can utilise in many processes. However, the first thing you have to do is understand it."