The Use of Heat in Modern Building Drying

Heat has been used by humans to dry wet materials for many thousands of years, by utilising natural sources of the sun or even man-made fire to the modern mechanical methods of electrical tumble driers.

Yet in the industry of drying wet buildings its use is fairly limited and currently the modern Damage Management Technician extensively uses techniques that originated from the late 1960's technology with procedures that started back in the 1970's, and have changed little other than cosmetic enhancements and the inclusion of variations of the same principles

So what is the process of drying in buildings all about? Well the Damage Management Technician is trying to get moisture in the form of a liquid (water in the building materials) to go through a "phase" change to a vapour, this phase change is called evaporation.

To get the liquid moisture to evaporate currently the general technique is to subject the air within the wet room to a continuous drop in vapour pressure by the use of dehumidification and the use of air movement over the surfaces of the wet materials to give the moisture a "push" into the surrounding lower vapour pressure air

Does this work? Yes, it is a process that in many different formats is successful, but could it be done more efficiently and quickly so that the building could be returned to the customer in a shorter time span?

The answer is yes, by simply utilising some principles of physics and giving the moisture sufficient extra energy to have the ability to escape the material it is within, as well as creating a "thirst" for the air within the room.

How? The energy supply is simply heat.....by adding heat to the material the energy (in the form of heat) is transferred to the water molecules, increasing their vibration and hence kinetic energy. This increased kinetic energy gives the moisture molecules sufficient momentum to escape the material they are in and into the surrounding air. This air, due to the addition of heat, has a greater ability to accept the evaporated molecules resulting in faster evaporation.

So why isn't energy (in the form of heat) used more widely in the Damage Management Industry? For two main reasons.

The first being a lack of understanding of how to use heat or how it actually works in the drying process plus the many cases of misinformation and horror stories (stories being fictional or exaggerated)

Secondly due to the fact that until now the use of heat was restricted to the “high energy” system which blasted high temperatures through a building so exposing some delicate building materials to the stresses of extremes in low vapour pressure, and the systems being used utilised products that needed constant monitoring by well trained technicians

So what types of heat energy are there?

Conduction

> The transfer of heat by direct contact of one material to another, so a hot material in direct contact to another will transfer that energy in the form of heat to the contacted material, yes we’ve all been subject to conduction, hot pan plus hand equals burns, and many choice words....

Convection

> The transfer of heat within a liquid or gas via an energy source, resulting in the bulk movement of molecules in the form of “convection currents”. We are all familiar with convection in a liquid or gas transporting heat away from a hot solid surface, such as boiling water in a pan; the pan surface gets hot and the convection currents in the water take the heat energy away.

Radiation

> The transfer of heat through empty space via electromagnetic radiation, from the heat source to the object being heated; this is how the sun heats the earth. Electromagnetic radiation has a huge spectrum from very short wave radiation like gamma rays and X-rays, through visible light and to longer wavelengths such as microwave and infrared. Heat radiation is in the infrared part of this spectrum and is the most widely currently used by specialist drying technicians; however the use of microwave technology in the building drying industry is not that far away.

Heat energy is paramount in creating faster evaporation, but until now the ability to control heat energy and the temperature (the basic measurement of heat) has been fundamental in creating numerous problems and the lack of its use in building drying

So how can heat energy or thermal energy be used to create a faster drying regime in modern building drying, getting around the problems that have limited its current use?

Firstly it must be considered that it has been widely recognised that raising the temperature within a building to above 25c is sufficient to increase the rate of evaporation and temperatures of above 30c greatly increase the rate of evaporation without causing any stress on the materials in old and new buildings. So we don’t really need that much heat energy in the first place.

Plus if this raising of the temperature is on a gradual or stepped process the materials themselves through conductive and convective heat transfer maintain a constant steady rise in temperature without any of the side effects that the stresses of blasting “hot” air over them can create

Secondly if the air within the room has a temperature that is constantly being monitored to establish a safe Specific or Absolute Humidity that will encourage faster evaporation but maintains a Relative Humidity that will not harm hygroscopic materials then safe evaporation can take place without the risk of secondary damage

So a system that gradually heats up the building to a safe level which is self monitoring to keep control of the environment and continuously changes the air within the room to remove the evaporated moisture, bringing in new fresh dry air to start again. Plus communicates with the technician on what is happening and when drying is complete, would be the ideal system for the 21st century Damage Management Technician

Does such a system exist? Yes, it uses convection heat and intelligence drying software systems which the Damage Management Technician is in complete control of.....at last using heat has finally come of age.