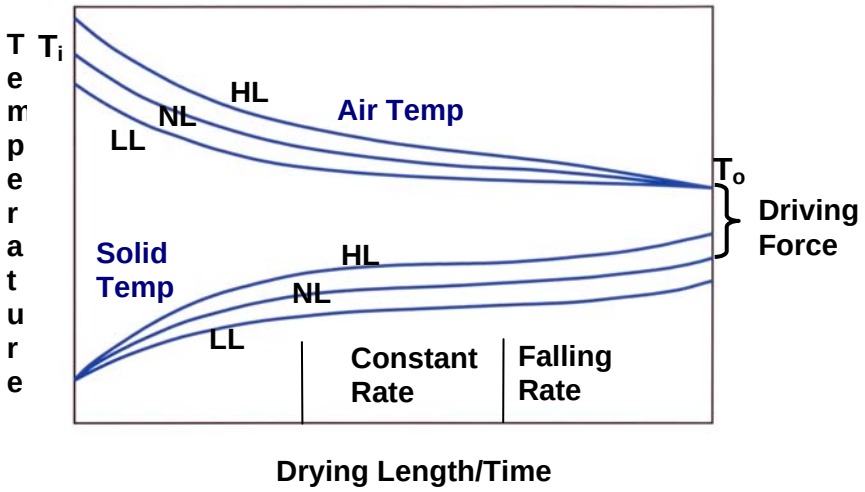
WEAKNESS OF THE EXHAUST TEMPERATURE METHOD FOR CONTROLLING PRODUCT MOISTURE CONTENT

Product moisture content exiting suspension dryers such as rotary, flash, ring, and spray is normally controlled by maintaining an exhaust temperature setpoint (To). Such exhaust temperature (ET) control systems are not effective because as soon as evaporative load changes enter the dryer, the control system is incapable of automatically adjusting to the correct setpoint (To) value that maintains the target moisture content.

Figure 1 shows curves for the air and product temperatures for such dryers. Air temperature curves are shown for high drying load (HL), normal load (NL) and for low drying load (LL). Corresponding product (solid) temperatures are shown by the lower curves. For the exhaust temperature (ET) control method, the final exhaust temperature (To) is always controlled to a constant dry bulb setpoint value. For example, suppose the exhaust temperature setpoint has been established for operation proceeding on the normal load (NL) graph and there is an increase in the water load to the dryers. The (ET) control system senses that the actual (To) value will have dropped and will react by increasing the inlet temperature (Ti) in order to maintain the constant outlet temperature (To) at its original value. After the change, the inlet temperature is now operating on the HL curve and its product temperature is on the HL curve. The difference in the exhaust temperature (To) and the product temperature on the (HL) curve represents the driving force for drying. In this example, the old setpoint for (To) would be too low and the resulting product moisture content would be higher than the target, and thus wet. This illustrates the need for an automatic method for adjusting the setpoint value for (To) to maintain the target moisture content under varying conditions of evaporative load. As a result, there is a significant amount of variation in the moisture distribution caused by this method of control.

Figure 1 - Driving Force for Drying Problems Using Exhaust Temperature Control



The DELTA T moisture control system corrects the deficiencies of the (ET) method with its unique, automatic setpoint adjustment method for disturbances (water load changes) entering the dryer. It has been successfully used for the control of rotary, flash, spray, ring, conveyor and fluidized bed dryers. It can usually reduce the standard deviation of the product moisture by a minimum of 30% because of its advantages of automatically adjusting the setpoint for disturbances entering with the feed, and because it senses the MC inside the dryer.