

# Eliminate Over-Drying and Pre-Curing

Here's a moisture measuring and control system that helps you take the guesswork out of drying

**O**ver-drying has always been the path of least resistance when drying fabric. When compared to under-drying (or drying above the regain), over-drying has always been the lesser of two evils.

Manufacturers have reluctantly chosen to over-dry rather than risk problems associated with under-drying fabric. This inability to accurately control exiting moisture plagues the textile industry by altering fabric color and performance, wasting energy and choking production.

To successfully post-cure resins, you must eliminate pre-curing (premature curing during drying). Inability to control exiting moisture, combined with the fear of under-drying, can result in pre-cured resins and subsequent failure of finished garment performance.

For over 10 years, the Delta T moisture control system has been successfully controlling exiting

product moisture content in a number of different industries (including textiles) in a variety of dryers (including tenter and loop dryers).

Off-the-shelf temperature probes can accurately sense product moisture inside a dryer. This information, combined with ability to make adjustments to the dryer speed and/or heat input allows accurate, continuous and automatic control of exit moisture. Delta T is the solution to over-drying; no longer do manufacturers have to accept over-dried fabric.

The process variable used in measuring moisture in the dryer is the delta t ( $\Delta T$ ). The  $\Delta T$  is the temperature difference between the inlet (hot-side) and outlet (cold-side) air temperature:  $T_{inlet} - T_{outlet} = \Delta T$

When you place hot-side and cold-side temperature probes in close proximity to the fabric web (Fig. 1),  $\Delta T$  becomes a measure of the evaporative load of the fabric.

Using  $\Delta T$  to Measure and Control Moisture. The evaporative load is

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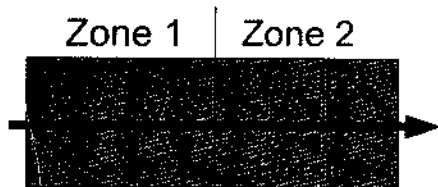


Fig. 1. This side view of a typical dryer shows location of probes.

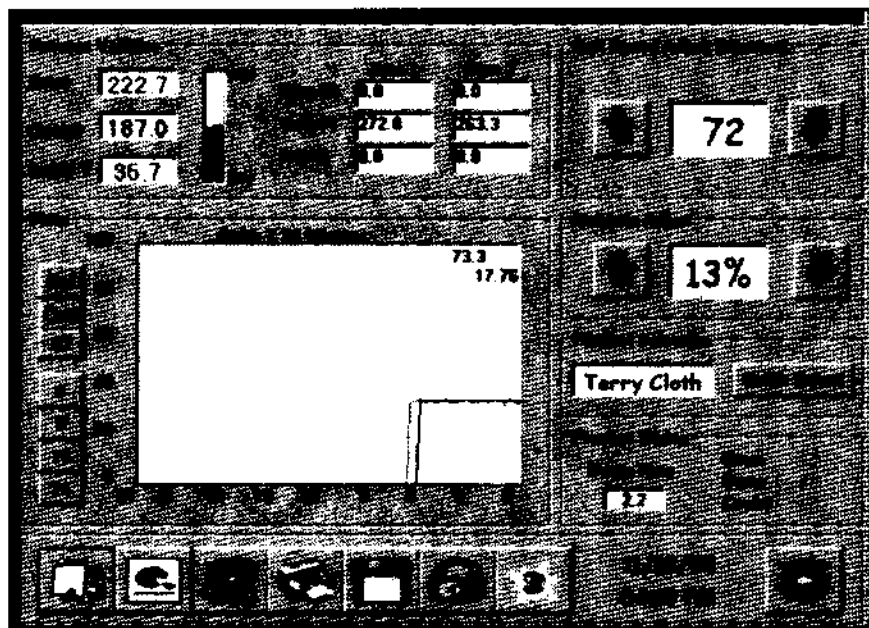


Fig. 2. Here is a typical screen for automatic control.

an important piece of information because it correlates directly to moisture content of the fabric. In short, using simple temperature probes to determine  $\Delta T$ , you can measure fabric moisture content inside the dryer.

During setup, you establish a  $\Delta T$  setpoint that corresponds to the fabric regain moisture (or some other target moisture depending on requirements).

During normal production the actual  $\Delta T$  will deviate from setpoint due to moisture variations entering the dryer. With no changes, fabric will be over- or under-dried.

With the Delta T, however, adjusting the fabric speed maintains the  $\Delta T$  setpoint. If  $\Delta T$  is held constant, then exiting fabric moisture content stays at regain or target moisture, regardless of entry changes.

The most important advantage of the Delta T is its ability to measure moisture inside the dryer. Most moisture control systems measure moisture after-the-fact (feedback), or outside the dryer.

Measuring moisture inside a dryer allows corrections of deviations before product exits the dryer. The Delta T also measures average moisture content across the entire web instead of a small field-of-view.

Because Delta T controls moisture to regain, and most textile manufacturers tend to over-dry, considerable production increases can be and usually are realized. Production increases with elimination of over drying. The net result is a dramatic reduction in unit energy consumption during

drying. Finally, fabric quality improves by producing a consistent product day-after-day, without altering color or performance.

You can virtually eliminate precuring of post-cure resins by eliminating over-drying and bone drying. No longer will you be in doubt about exit moisture content.

If your drying system includes curing, Delta T can also ensure that fabric is exposed to required temperature for a specified dwell time. Delta T features a Windows-NT-based operator interface complete with display of process variables (with trending), product selection menus and dryer view (Fig. 2).

Delta T also comes standard with a modem for on-line communications. This feature is useful for rapid response to service problems, software upgrades, and periodic system checks.

Operators with little or no computer experience will quickly master machine control through the system's intuitive control screens. Maintenance personnel appreciate the "dryer view" screen when monitoring oven performance or diagnosing problems.

Although tenter and loop dryers

differ in how they dry fabric, Delta T application is identical. Both dryers will have at least a pair of temperature probes in close proximity to the fabric somewhere in the second half of the dryer (actual location of probes depends on exact architecture of the dryer). Setpoints in both correspond to fabric regain moisture content (or some other target) at the oven exit.

Whatever the reason for needing moisture control (eliminating over-drying or pre-curing), simply knowing what goes on inside your dryer and the ability to control target moisture is of great value.

Essentially this moisture control system takes the guesswork out of drying. It allows operators to take charge of their dryers and makes the machines work for them.

Managers will rely on the system to significantly reduce day-to-day variability of product. They will no longer view dryers as uncontrollable beasts, but manageable machines on which they can implement Statistical Process Control. □  
Ed. note: *TEXTILE WORLD's 1999 Dryer/Oven Chart*, beginning on p. 48, contains details on 48 models from 33 manufacturers.