

Dyne Testing — Applications and Tips

The dyne test has found countless applications throughout industry, in functions as varied as basic research, product development, process control, incoming inspection, finished product dispositioning, sales, and marketing. Typically, it measures the treatment level of polymers which have been exposed to flame, corona, or plasma surface modification; but, inevitably, after nearly 50 years, many less traditional applications have also been explored. Hopefully the following comments will be helpful.

- Whenever feasible, test with supplies, samples, and ambient temperature at 20° to 25°C. If this is impossible, it is advised that a test study be run to relate temperature variations to numerical results. Keep test supplies at ambient temperature at all times.
- Film extruders should test extensively — every roll from every machine without fail. Potential product liability and customer satisfaction losses far exceed the cost of an effective QC program. **ACCU DYNE TEST™** Marker Pens can be used, with laboratory contact angle tests used as a backup audit.
- Remember that dyne level decay is extremely rapid directly after corona treatment. A virtually immediate loss of 10 dynes/cm is possible! This is due to contact with process rolls (especially heated metal ones), surface blooming of additives, and interfacial transfers between treated and untreated surfaces within the finished, wound roll. If you are a slitter, rewinder, or extruder, either test far downstream in the process, or increase your specification to account for greater losses before your customer tests at incoming inspection.
- It is often possible to identify patterns of treatment variation on a sample piece by doing drawdown tests. Methodical troubleshooting analysis will often lead back to the specific cause. For example, increasing treatment across the roll suggests the treater electrode is misaligned to the roll; periodic variations along the web may relate to non-concentricity.
- An easy test for back-treat on PE or PP is to use a 34 dyne/cm **ACCU DYNE TEST™** Marker Pen. Any wetting — even for less than two seconds — indicates some treatment.

- Test markers which have turned green or seriously lose their color density are no longer reliable.
- Never leave markers uncapped! Evaporation, water vapor, and airborne contaminants all affect dyne level, and can invalidate them long before expiration.
- Printers, coaters, and laminators should pull samples and perform the test as soon before the print station (or similar) as possible. It may be worthwhile to dyne test the roll before it goes on the machine, and compare these results to material which has run through the web handling process to the print station. This will indicate the treat loss attributable to process roll contact and web handling.
- Polyester film which reads consistently below 42 dynes/cm is almost certainly "print primed." This chemical process actually decreases the surface energy a bit, but makes the surface attractive to a far broader range of compounds used in inks and coatings.
- Cleaning systems can be monitored by the dyne test. The surface energy of metals is much higher than that of surface contaminants; thus, the higher the dyne level, the cleaner the part is. Always use test fluids to measure cleanliness — even our spring-loaded valve tip markers will eventually be overwhelmed by repeated exposure to contamination.
- The presence of mold release on many plastic parts can be similarly identified. Again, test fluids are indicated for this application.