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PRIMER INTELLIGENCE

TREATMENT + PRIMER = SUCCESS!

Do we have to prime if we treat? Do we have to treat if we prime? The answer is YES to both questions, when extrusion coating onto film substrates such as polypropylene.

The function of a chemical primer is to enhance *adhesion* and contribute *product resistance* to a converted structure.

Treatment (by flame or corona discharge) before priming serves two purposes:

1. It oxidizes the film substrate, which adds functional groups to the surface. These oxidized sites act as chemical anchors onto which the primer can hold.
2. It raises the surface energy of the film, which promotes good wet out (film formation) of a water based primer.

A common misunderstanding is alive and well in the converting industry: the belief that if the primer wets out it will effectively bond to the substrate. This is misleading! See the following example.

TROUBLESHOOTING

SITUATION: A water based primer "crawls" (beads up) on a polypropylene film substrate. Alcohol is added to the primer process mix, which encourages better wet-out of the surface. The OPP is coated with the water-alcohol process mix, dried and polyethylene is extruded onto the primed substrate. When the lab examines a sample of the construction, they find that the adhesion is poor at the primed interface. Eosin testing shows the primer has released from the film. Why?

SOLUTION: The primer has not adequately bonded to the substrate because there are no oxidized sites available for adhesion. Treatment of the film immediately prior to priming would have yielded an inseparable OPP/primer/PE bond.

Often films come pretreated by the film supplier. Because many films contain migratable additives, we recommend re-treatment of these substrates in-line, before priming. The in-line treatment will clean off any "contaminants" that are notorious for interfering with adhesion. Such materials include slip agents or other modifiers that may have migrated or offset to the surface since the first treatment. Once removed, the primer will wet out properly and securely adhere to the surface. When working with highly modified film substrates, it is important to be sure the additives that have bloomed to the surface have been *completely eliminated* by the in-line treatment process prior to priming.

The next page shows industry guidelines for treatment levels.

Next Issue: The risks of *over*-treating polyester and nylon film substrates.

INDUSTRY GUIDELINES FOR TREATMENT LEVELS[1]

Table 1. Inherent Dyne Levels of Virgin Substrates

VIRGIN MATERIAL	SURFACE ENERGY, dynes/cm
Nylon	46
Polyester	43
Cellulosics	42
Saran	40
Vinyl, acrylic	39
Ionomer (high)	37
Ionomer (low), Polystyrene	33
Polyethylene (LD & HD)	31
Polypropylene	29

Table 2. Approximate Treatment Levels Recommended for Selected Materials

SUBSTRATE	APPLICATION	TREATMENT LEVEL, dynes/cm
Low-density PE	Printing	38-40
	Coating, Laminating	48-54
High-density PE	Printing	38-40
	Coating, Laminating	48-54
Polypropylene	Printing	38-40
	Coating, Laminating	48-54
PVC	Coating	48-54
Polyester	Coating, laminating	48-54
PE Foam	Coating	48-56
Aluminum foil	Laminating	72
Paper	Coating	N/A

1. Markgraf, D. "Practical Aspects of Determining the Intensity of Corona Treatment," Tappi Journal, 68 (2), pp.74 - 76 (1985)