CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2006

DateRun: 06/05/2006

Experimenters: Jason Marshall

ClientType: General

ProjectNumber: Project #2

Substrates: Plastic

PartType: Coupon

Contaminants: Inks, Paints

Cleaning Methods:

Analytical Methods:

Purpose: Summary of testing performed on alternatives for paint removal from golf balls.

Experimental Procedure: Three trials were conducted on the supplied painted balls. During the evaluations, one of the current cleaning chemicals was used as a bench mark. Testing included immersing the balls in a cleaning product and cleaned using ultrasonic energy. Time and temperature were modified in an attempt to find optimum conditions for products that showed signs of removing the paint. Testing was conducted using 30 minutes of cleaning and 130-150 F

Results: None of the 26 products or product mixtures tested performed as well or as fast as the current cleaning solvent. Several products/mixes did show some ability to remove the paint and ink from the surface. The table below lists the results for various formulations evaluated. Products listed more than once were tested under different conditions.

Product	Effective	Comments
D Zolv 1012	Yes	Current solvent needed less than 10 minutes
D Zolve 1012 @10%	No	No visual effect
D Zolve 1012 @50%	No	Some removal of ink - ball still shiny
Bio T Max	No	No change in paint
Citrus Burst 7	No	Lost shine - not smooth feeling
D Limonene	No	Pock marks on surface; still had shine
DBE 5/6	Partial	Slightly less removal of paint than SC Actisolv
DFC Degreaser	No	No removal
DS 104	Partial	Removed some of the paint
EP 921	No	Removed a lot of the paint; However the ball was damaged
Ink Zapper	No	No visual change; felt different
Inproclean 4000 T	Partial	Looked different; slight change
Inproclean 4000 T	Partial	Good removal at 30 minutes. Paint could be peeled off along with the ink. Still had some paint left. With additional cleaning time the alternative may have started to affect the plastic ball

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Inproclean 4000 T 30%; Followed with 20 minutes of cleaning with Metabolix & Actisolv mix	No	Did not improve cleaning
Ionox HC2	Partial	Some coating may have been removed. Less shine
Metabolix E3HB	Partial	Some removal, not as shiny, ink coming off
Metabolix & Actisolv 50-50 mix	Partial	Good removal, ink very faded
Pinene	No	No change in paint
SC Actisolv	Partial	Lost shine; not smooth; little ink removed; closest to current solvent
SC Actisolv	Partial	Little change from the previous trial at 130 F; Still had paint left on golf ball
SC Actisolv & Inproclean 4000 T & Water 50%-15%-35%	Partial	Paint flaking off with some ink removal; Additional 30 minutes had lots of paint flaking off and ink nearly gone; Not completely cleaned
SC Supersolv	Partial	Some spots tacky; no ink removal; coating started to pull up; looked like "crystals" forming; lost shine
Shopmaster RC	Partial	Black ink could be rubbed off; still smooth w/ shine
Solsafe 245	No	no visual change; felt different
Soy Cleaner 180 D	No	No removal
Soy Clear 1500	No	Only one small spot removed
Soy Gold 2000	No	No change in paint

Summary:

Conclusion: Despite some of the products having moderate success when mixed with other successful products, nothing worked as well as the current solvent.