

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2006
DateRun: 06/06/2006
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.