

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2007

DateRun: 01/17/2007

Experimenters: Jason Marshall

ClientType: Lab

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Greases, Dirt, Oil

Cleaning Methods: Low Pressure Spray

Analytical Methods: Gravimetric

Purpose: Laboratory evaluations of alternative aerosol cleaning products

Experimental Procedure: Basic cleaning performance testing was conducted using ASTM G122 as the bases for cleaning. Six products were selected for testing based on previous testing on the selected soil. All six products were used at full strength at room temperature. Each product, approximately 500 mls, was then poured into an EnviroCaddie aerosol spray system and pressurized to just under 95 psi using Nitrogen. Eighteen preweighed aluminum coupons were coated with a collection of brake/engine soil collected from an automobile shop. The coupons were allowed to sit for one day before a second weight was recorded. Three coupons were cleaned with each solution for 30 seconds via the aerosol spray system. Coupons were not rinsed and were air dried at room temperature for 5 minutes. Following drying, final weights were recorded and cleaning efficiencies were calculated.

Results: Five products removed over 85% of the brake soil in under 30 seconds of spray cleaning. Most of the products took longer to dry than previous tested products and/or left a small amount of liquid at the bottom of the coupons. Wiping the off the coupons resulted in cleaning efficiencies above 90%. The table below lists the amount of soil applied, the amount remaining and the efficiency for each coupon cleaned.

| Cleaner | Initial wt | Final wt | % Removed |
|--------------------|------------|----------|-----------|
| Harvest Gold | 0.1920 | 0.0683 | 64.43 |
| | 0.3320 | 0.1034 | 68.86 |
| | 0.3309 | 0.1212 | 63.37 |
| Soy Gold 1000 | 0.6389 | 0.0247 | 96.13 |
| | 0.8212 | 0.0275 | 96.65 |
| | 0.7286 | 0.0702 | 90.37 |
| Citrus Soy Solvent | 0.6523 | 0.0154 | 97.64 |
| | 0.5848 | 0.0258 | 95.59 |
| | 0.6709 | 0.0242 | 96.39 |
| Maxisolv | 0.3716 | 0.0219 | 94.11 |
| | 0.1359 | 0.0182 | 86.61 |
| | 0.5639 | 0.0082 | 98.55 |
| Soy Gold 2000 | 0.4519 | 0.0282 | 93.76 |
| | 0.1839 | 0.0287 | 84.39 |
| | 0.1486 | 0.0206 | 86.14 |
| SL 100 | 0.1408 | 0.0163 | 88.42 |
| | 0.3792 | 0.0310 | 91.82 |
| | 0.1701 | 0.0222 | 86.95 |

The next table lists the average efficiencies after wiping coupons to remove cleaning residue.

| | Wipe Ave Efficiency |
|--------------------|---------------------|
| Soy Gold 1000 | 97.86 |
| Citrus Soy Solvent | 97.68 |
| Maxisolv | 94.67 |
| Soy Gold 2000 | 90.12 |
| SL 100 | 92.64 |

Summary:

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|-----------------------------------|--|---------------|--------------------|-------------------------------------|----------------------|
| Substrates: | Aluminum | | | | |
| Contaminants: | Greases, Dirt, Oil | | | | |
| Company Name: | Product Name: | Conc.: | Efficiency: | Effective: | Observations: |
| United Laboratories International | United 2002 Harvest Gold | 100 | 65.55 | <input type="checkbox"/> | |
| AG Environmental Products | Soy Gold 1000 | 100 | 94.38 | <input checked="" type="checkbox"/> | |
| Bi-O-Kleen Industries | Citrus Soy Solvent Cleaner & Degreaser | 100 | 96.54 | <input checked="" type="checkbox"/> | |
| Gemtek Products | Safe Care (SC) Maxi Solv | 100 | 93.09 | <input checked="" type="checkbox"/> | |
| AG Environmental Products | Soy Gold 2000 | 100 | 88.10 | <input checked="" type="checkbox"/> | |
| Bi-O-Kleen Industries | Soy Lube- SL 100 | 100 | 89.07 | <input checked="" type="checkbox"/> | |

Conclusion: Some of the alternatives may need to be wiped dry. Despite the residue, all cleaners removed over 85% of the brake soil.