CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2003
DateRun:	05/31/2003
Experimenters:	Chang Won
ClientType:	Lab
ProjectNumber:	Project #1
Substrates:	Wood
PartType:	Coupon
Contaminants:	Coatings, Paints
Cleaning Methods:	Manual Wipe
Analytical Methods:	Gravimetric, Visual
Purpose:	Laboratory evaluations of alternative cleaning products
Experimental Procedure:	Basic cleaning performance testing was conducted using ASTM G122 as the bases for cleaning. Review of Wood Strippers using quantitative and qualitative assessment.
Results:	03-WD-PA-6- After selecting five best alternative strippers of ten tested strippers, MSDS were reviewed for the chemical ingredients and their health effects. SI #4 Coating Remover contains more than 67% N-methylen-2-pyrrolinone (NMP), Peel Away 7 has 20-50% NMP, Safety Peel 1 has less than 30%. Force 9 Heavy Duty Cleaner contains dimethyl adipate and triethyl phosphate. Take off Green contains 15-40 % of acetone and methanol. All of these five strippers tested for evaluating coating removal efficiency comparing with a DCM-based stripper, Strypeeze which contains 10-15% DCM. Generally, paint stripping formulation contains 60-65% DCM with other components. Quantitative Test results Stripper SI #4 Coating Remover has the best efficiency of 77.2% for all paints and woods followed by 75.4% of Peel Away 7, 73.5% of Safety Peel 1, 73.2 % of Force 9 Heavy Duty Cleaner, 72.90% of Strypeeze, and lastly 71.6% of Take off Green on average. The highest efficiency of 84.4% was of oil-based paint, 84.0% of polyurethane and 53.4% of water-based paint on average. Statistical analysis All statistical analyses were done in PC-SAS using the analysis of variance (ANOVA) comparing the cleaning efficiency with three kinds of variables such as strippers, coating types, and substrates for each coating chemicals. In each of ANOVA, the analysis compared the means of coating removing efficiency. The probability value known as significant level was set by 0.05. In the ANOVA for the results of the coating removal efficiency, because the model is not significant (significance probability p=0.7226) we conclude that all the paint strippers are not significantly different based on efficiency. The SHEFFE option in the MEANS statement compares the efficiencies between strippers. Letters are used group means, and the means with the same letters are not significantly different from each other (at the p=0.05 level). The statistical results show that one stripper is not higher efficiency than others. In regard to removal efficiency on different types of coating, we can say that not all the paints are the same results because the model is significant (significance probability p <0.0001). The SHEFFE option in the MEANS statement compares the weight of wooden coupon between the coupons applied different paints. Letters are used to group means and means with the same letters are significantly different each other (at the p=0.05 level). The result showed that water-based paint removal was lower in efficiency than others but not all other paints had different efficiencies. In regard to the coating removal efficiency on different types of substrates, because the model is marginally significant (significant probability p=0.05) we conclude that all the wooden coupons are not same removal rate by all strippers. However, the SHEFFE option in the MEANS statement compares the weights of the coupons between different types of coupons. These results indicate that the efficiency of all strippers does not differ when tested on wooden coupons. Qualitative Test Results The SI #4 Coating Remover was the highest or one of highest removal rank for all paint on the all wood types with ASTM rank from 3.4 to 4.9 except acrylic resin (water-based) paint on pine and poplar wood. Peel Away 7 showed the one of best removal rate or second for all paint on all wood types with ASTM rank from 3.4 to 4.8 except polyurethane on poplar wood. Force 9 was the best efficiency with Take Off Green for water-based paint on pine wood. Take Off Green is one of top rank for oil-based alkyl paint on pine wood and water-based paint on oak substrate. Strypeez showed the one of best removal rate for oil-based paint on poplar wood and pine, and for polyurethane on pine wood. All strippers did not effect original condition of substrates.

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Summary:

Substrates:	Wood				
Contaminants:	Coatings, Paints				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Savogran Company	SI #4 Coating Remover	100	77.20	☑	Overall average
Dumond Chemicals Inc	Peel Away 7	100	75.40	☑	Overall average
Prosoco Inc	Enviro Klean Safety Peel	100	73.50	☑	Overall average
Pollux Company	Force 9	100	73.20	☑	Overall average
Vertec BioSolvents	Take Off Green	100	71.60	☑	Overall average
Savogran Company	Strypeeze	100	72.90	☑	Overall average

Conclusion:

Site Survey
The yellow pages on the internet were used to find the paint stripping facilities. The purpose of this research was to find the location of facilities in metro Boston areas to have them participate in a telephone and an on site survey. 21 participating facilities were asked questions about facility size, their chemicals use and general operation.

And in order to find a barrier for implementation of pollution prevention opportunity, 7 paint stripping facilities were visited, and 14 facilities were contacted by telephone. All facilities had employees between one to ten people. All facilities were using DCM based strippers with the exception one, which was using NMP based stripper. All workers in the facilities were aware of any health hazards associated with DCM. Most facilities surveyed wanted to adopt an alternative safe chemical stripper and expected a more effective and a less costly stripper in the market. They were willing to replace the traditional stripper with safe substitutes.