CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2005
DateRun:	05/26/2005
Experimenters:	Jason Marshall
ClientType:	Environmental Service Firm
ProjectNumber:	Project #1
Substrates:	Wood
PartType:	Coupon
Contaminants:	Coatings
Cleaning Methods:	
Analytical Methods:	Performance Test
Purpose:	To determine the coefficient of friction for various floor finishes.

Experimental Procedure:

Control of Moisture Content and Temperature
The moisture content at the time of testing will influence results due to the hydroscopic nature of the base materials. Therefore, efforts must be taken to ensure that the moisture content and temperature remain constant during the evaluation period. Ideally, the sample floor should be kept at 65+/-1% relative humidity and 68+/-6 F.

During laboratory testing, conditions were slightly drier, 40% relative humidity, but the temperature was within the given temperature range ~70 F).

Sample Preparation
The flooring material supplied was Hardwood flooring made from Red Oak. The boards were ¾" thick, 2 ¼" wide and cut into 8" sections. Some pieces of the flooring had to be sanded prior to making initial thickness readings to remove residual packing tape adhesive. With the boards cut into 8" coupons, three readings were made using a Brown & Sharpe Micrometer to measure each coupons initial board thickness. Each reading was made to 0.001" and the three values were averaged to give a baseline thickness for the coupons. In addition to the thickness baseline, baselines were established for Gloss, Coefficient of Friction, Impact, Small Area Loads. Procedures for each baseline measurements followed the procedures to be outlined.

Following the establishment of the baselines, three coupons were coated with a supplied floor finish according to the manufacturers' specifications. The finish was applied using a 1" Pure Bristle 1500 paint brush. To ensure consistent coating application, the finish was leveled off using a 10 mils Precision Gage & Tool Co Dow Film Caster. Three coats were used for each floor finish as this was common number of coating layers suggested by the various manufacturers. Each coating layer was allowed to dry for 2 hours prior to the application of the next coat. Completed coupons were allowed to sit for a minimum period of 24 hours before performance evaluations were conducted.

Coefficient of Friction
The ASTM specified apparatus was replaced with an IMASS, Inc SP-102B-3M90 Slip/Peel Tester (Figure 1). Two types of friction coefficients were measured using this instrument. The first, Static CoF, was determined by obtaining the force required to move the specimen from a stationary position. The second, Sliding CoF (or Kinetic), was found by measuring the average force required to maintain movement at a certain rate. Measured forces will have peaks and valleys in the amount of force needed to keep moving. Average these values results and dividing by the weight of the object will result in the desired coefficient.

Figure 1. IMASS Slip/Peel Tester

The Slip/Peel tester was first adjusted to ensure that the device was properly calibrated for the sled weight being used. A coupon was then placed and clamped onto the bed of the device. The speed of the bed was set to 45"/min. The instrument records two values, the peak, the valley and calculates the average. The device was run three times per coupon for measuring the Static CoF and three times to measure the Kinetic CoF. Each coupon's value was averaged and then the values for each finish (three coupon averages) were averaged to get one value for the Static Coefficient of Friction and one value for the Kinetic Coefficient of Friction. These values for coated samples were compared to the CoF for the same uncoated coupons.

Coefficient of Friction = Ratio of tractive (pulling) force to the normal force (sled weight): CoF = F/N = (Tractive force)/(Normal Force) = (meter reading)/(sled weight)

Results:

Product ID Products Tested:
2 Capitol Polyurethane Gloss
3 Pro Finisher Water Based Polyurethane for floors
4 Pro Finisher Water Based Sanding Sealer
5 Quide SA Aqua Deva Metro

Uncoated			Static			Kinetic	
	Coupon #	Peak	Valley	Average	Peak	Valley	Average

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Capitol Polyurethane Gloss	52	848	562	606	614	538	571
		767	529	581	640	543	586
		778	538	583	619	530	575
	53	663	528	542	509	497	507
		757	522	527	508	493	505
		692	506	517	514	498	503
	54	783	532	535	544	499	526
		801	523	525	518	481	505
		730	568	514	513	479	499
Pro Finisher Water Based Polyurethane for floors	55	764	538	549	533	519	516
		733	526	506	523	501	512
		713	518	532	515	493	507
	56	806	573	604	630	570	599
		794	567	600	634	574	605
		799	568	600	642	573	602
	57	780	556	573	555	514	533
		758	546	559	558	544	545
		742	546	553	540	511	522
Pro Finisher Water Based Sanding Sealer	58	778	567	597	591	528	563
		739	576	592	577	527	554
		761	560	565	592	540	558
	59	961	671	694	697	632	659
		895	666	688	697	633	657
		846	636	669	705	627	654
	60	774	536	560	582	516	533
		800	521	542	569	512	527
		708	534	536	567	505	525
Quide SA Aqua Deva Metro	61	871	558	584	572	515	544
		850	543	560	567	520	539
		819	563	563	565	514	538
	62	760	525	542	554	514	526
		720	512	528	545	510	523
		712	519	525	538	507	517
	63	803	617	650	622	608	611
		756	625	630	617	589	606
		718	610	613	612	605	602
		765	548	563	572	528	546

Capitol Polyurethane Gloss

	Static			Kinetic	
Peak	Valley	Average	Peak	Valley	Average
798	543	590	624	537	577
704	519	529	510	496	505
771	541	525	525	486	510
758	534	548	553	506	531
Pro Finisher Water Based Polyurethane for floors					
737	527	529	524	504	512
800	569	601	635	572	602
760	549	562	551	523	533
765	549	564	570	533	549

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Pro Finisher Water Based Sanding Sealer					
759	568	585	587	532	558
901	658	684	700	631	657
761	530	546	573	511	528
807	585	605	620	558	581
Quide SA Aqua Deva Metro					
847	555	569	568	516	540
731	519	532	546	510	522
746	594	602	600	574	585
775	556	568	571	534	549

Coated

			Static			Kinetic	
	Coupon #	Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss	52	1031	654	756	761	672	732
		812	650	744	783	672	733
		843	667	744	783	669	740
	53	829	725	756	758	742	749
		816	736	758	799	734	758
		829	740	753	752	742	748
	54	1126	765	813	873	756	773
		875	754	780	853	741	780
		879	754	771	850	741	772
Pro Finisher Water Based Polyurethane for floors	55	860	550	559	603	534	560
		815	556	560	590	549	557
		763	547	563	594	540	556
	56	1961	674	1114	1425	650	892
		1629	654	1033	1343	634	884
		1597	640	966	1291	598	862
	57	1052	609	618	725	654	688
		692	602	611	703	666	675
		948	689	701	707	641	670
Pro Finisher Water Based Sanding Sealer	58	738	633	675	662	616	631
		695	602	640	644	593	624
		791	618	637	632	604	614
	59	869	656	698	763	624	662
		901	659	691	748	625	659
		898	650	670	766	616	654
	60	784	633	682	694	588	613
		778	614	658	675	591	632
		736	592	648	683	575	627
Quide SA Aqua Deva Metro	61	744	614	663	623	576	597
		751	588	617	596	581	608
		652	581	609	612	566	592
	62	832	612	653	673	574	623
		870	566	628	644	601	606
		823	608	620	649	580	602
	63	717	557	585	622	546	581
		1001	550	583	578	564	601
		800	550	582	610	538	576

Summary

	Static			Kinetic	
Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss					
895	657	748	776	671	735
825	734	756	770	739	752
960	758	788	859	746	775

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893	716	764	801	719	754
110	46	22	46	36	18
Pro Finisher Water Based Polyurethane for floors					
813	551	561	596	541	558
1729	656	1038	1353	627	879
897	633	643	712	654	678
1146	613	747	887	607	705
Pro Finisher Water Based Sanding Sealer					
741	618	651	646	604	623
889	655	686	759	622	658
766	613	663	684	585	624
799	629	667	696	604	635
Quide SA Aqua Deva Metro					
716	594	630	610	574	599
842	595	634	655	585	610
839	552	583	603	549	586
799	581	616	623	570	598

Initial Uncoated Readings

	Static			Kinetic		
	Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss	758	534	548	553	506	531
Pro Finisher Water Based Polyurethane for floors	765	549	564	570	533	549
Pro Finisher Water Based Sanding Sealer	807	585	605	620	558	581
Quide SA Aqua Deva Metro	775	556	568	571	534	549

Final Coated Readings

	Static			Kinetic		
	Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss	893	716	764	801	719	754
Pro Finisher Water Based Polyurethane for floors	1146	613	747	887	607	705
Pro Finisher Water Based Sanding Sealer	799	629	667	696	604	635
Quide SA Aqua Deva Metro	799	581	616	623	570	598

Final - Initial

	Static			Kinetic		
	Peak	Valley	Average	Peak	Valley	Average
Capitol Polyurethane Gloss	136	182	216	248	212	223
Pro Finisher Water Based Polyurethane for floors	381	65	183	317	74	156

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Pro Finisher Water Based Sanding Sealer	-8	43	62	77	46	54
Quide SA Aqua Deva Metro	24	25	48	52	36	49

Summary:

Conclusion: The Pro Finisher Water Based Polyurethane had the highest peak Coefficient of Friction for both Static and Kinetic methods. The other water based products had limited improvement in the CoF.