CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2006
DateRun:	06/28/2006
Experimenters:	Jason Marshall
ClientType:	Consultant
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 64% relative humidity and the temperature was ~74 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.

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 proper coating application rates, the coatings were applied via pipettes to surface. Three coats were used for each floor finish as this was common number of coating layers suggested by the various manufacturers.

The first two coatings were allowed to dry for 2 hours prior to the application of the next coat. The second coat for the current process was allowed to dry overnight before the application of final coat. The 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:

Uncoated CoF Readings

Initial CoF		Static			Kinetic		
Product	Coupon #	Peak	Valley	Average	Peak	Valley	Average
CP	1	590	482	503	550	492	511
		659	493	513	511	484	497
		606	487	504	524	491	501
	2	578	468	483	496	415	441
		694	463	477	535	483	497
		692	461	476	518	468	481
	3	691	483	497	523	480	493
		689	480	491	507	479	492

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		647	482	494	521	474	486
MCP	4	638	486	498	509	439	465
		671	474	489	489	421	434
		641	476	489	503	450	461
	5	667	431	445	512	468	480
		643	437	451	516	470	483
		686	431	443	521	458	477
	6	588	440	451	477	436	447
		614	446	456	475	441	452
		549	452	464	489	435	445
BO	7	779	549	564	578	505	518
		763	560	574	602	559	572
		799	517	530	568	507	522
	8	625	472	486	530	455	466
		579	476	486	508	435	450
		610	449	463	534	469	473
	9	561	448	473	496	450	467
		667	504	468	501	455	475
		579	447	468	500	448	468
BW	10	417	439	439	474	424	429
		472	419	432	468	423	430
		595	403	426	466	427	430
	11	522	456	461	471	439	448
		666	436	451	469	435	451
		555	440	453	474	451	454
	12	799	447	462	468	413	433
		760	421	434	448	415	431
		669	415	432	466	404	434
Blank	13	687	422	452	474	426	433
		592	414	437	469	419	430
		631	424	436	469	420	432
	14	542	425	453	457	397	425
		570	425	453	449	391	414
		730	404	429	452	385	420
	15	600	452	468	447	422	432
		531	432	445	448	416	428
		650	418	436	437	414	425

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	Static			Kinetic		
CP	Peak	Valley	Average	Peak	Valley	Average
	618	487	507	528	489	503
	655	464	479	516	455	473
	676	482	494	517	478	490
Product Ave	650	478	493	521	474	489
MCP	650	479	492	500	437	453
	665	433	446	516	465	480
	584	446	457	480	437	448
Product Ave	633	453	465	499	446	460
BO	780	542	556	583	524	537
	605	466	478	524	453	463
	602	466	470	499	451	470
Product Ave	662	491	501	535	476	490
BW	495	420	432	469	425	430
	581	444	455	471	442	451
	743	428	443	461	411	433

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Product Ave	606	431	443	467	426	438
Blank	637	420	442	471	422	432
	614	418	445	453	391	420
	594	434	450	444	417	428
Product Ave	615	424	445	456	410	427

Coated CoF Readings

Final CoF		Static			Kinetic		
Product	Coupon #	Peak	Valley	Average	Peak	Valley	Average
CP	1	883	835	858	866	809	843
		1190	814	843	887	789	855
		1048	818	845	882	802	859
	2	1117	799	876	918	803	873
		1104	805	865	936	836	888
		1292	811	870	925	862	890
	3	1063	905	840	920	899	914
		939	884	909	928	893	914
		1114	870	906	928	907	919
MCP	4	824	720	742	720	670	704
		825	698	727	709	644	706
		802	657	712	739	682	713
	5	946	733	738	737	687	720
		983	731	726	729	717	722
		902	696	721	736	716	719
	6	887	761	769	744	626	729
		985	733	741	761	746	750
		854	736	741	740	734	738
BO	7	600	398	429	521	443	492
		529	430	473	516	440	484
		560	450	490	522	445	482
	8	482	437	448	472	450	456
		686	453	461	460	450	451
		633	450	458	459	444	431
	9	590	484	547	610	512	587
		688	417	541	578	490	554
		701	497	581	657	507	605
BW	10	628	452	494	550	514	526
		663	486	526	580	509	521
		805	472	513	541	483	495
	11	789	522	604	696	485	585
		689	519	587	693	492	577
		672	513	583	656	486	566
	12	532	437	440	445	403	422
		615	430	446	446	402	418
		467	416	436	520	383	429
Blank	13	586	489	506	533	474	497
		566	436	469	511	432	466
		616	460	482	505	443	469
	14	562	416	433	462	408	432
		654	404	433	461	409	430
		638	406	432	459	401	422
	15	663	436	455	461	450	457
		569	435	450	465	434	446
		574	435	447	462	436	448

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	Static	Kinetic

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	Peak	Valley	Average	Peak	Valley	Average
CP	1040	822	849	878	800	852
	1171	805	870	926	834	884
	1039	886	885	925	900	916
Product Ave	1083	838	868	910	844	884
MCP	817	692	727	723	665	708
	944	720	728	734	707	720
	909	743	750	748	702	739
Product Ave	890	718	735	735	691	722
BO	563	426	464	520	443	486
	600	447	456	464	448	446
	660	466	556	615	503	582
Product Ave	608	446	492	533	465	505
BW	699	470	511	557	502	514
	717	518	591	682	488	576
	538	428	441	470	396	423
Product Ave	651	472	514	570	462	504
Blank	589	462	486	516	450	477
	618	409	433	461	406	428
	602	435	451	463	440	450
Product Ave	603	435	456	480	432	452

Cof F Difference

	Static			Kinetic		
Product	Peak	Valley	Average	Peak	Valley	Average
CP	434	360	375	389	370	395
MCP	257	266	270	236	245	262
BO	-55	-45	-9	-2	-11	15
BW	45	41	71	103	36	67
Blank	-12	11	11	24	22	25

Summary:

Conclusion:

The current practice coating matrix had the greatest increase in both static and kinetic coefficient of friction followed by the modified current practice. The increase represents more traction on the floor.

The Bona Oil mix was the only product that had lower coefficient of friction after application of the coating. This would result in a more slick surface.