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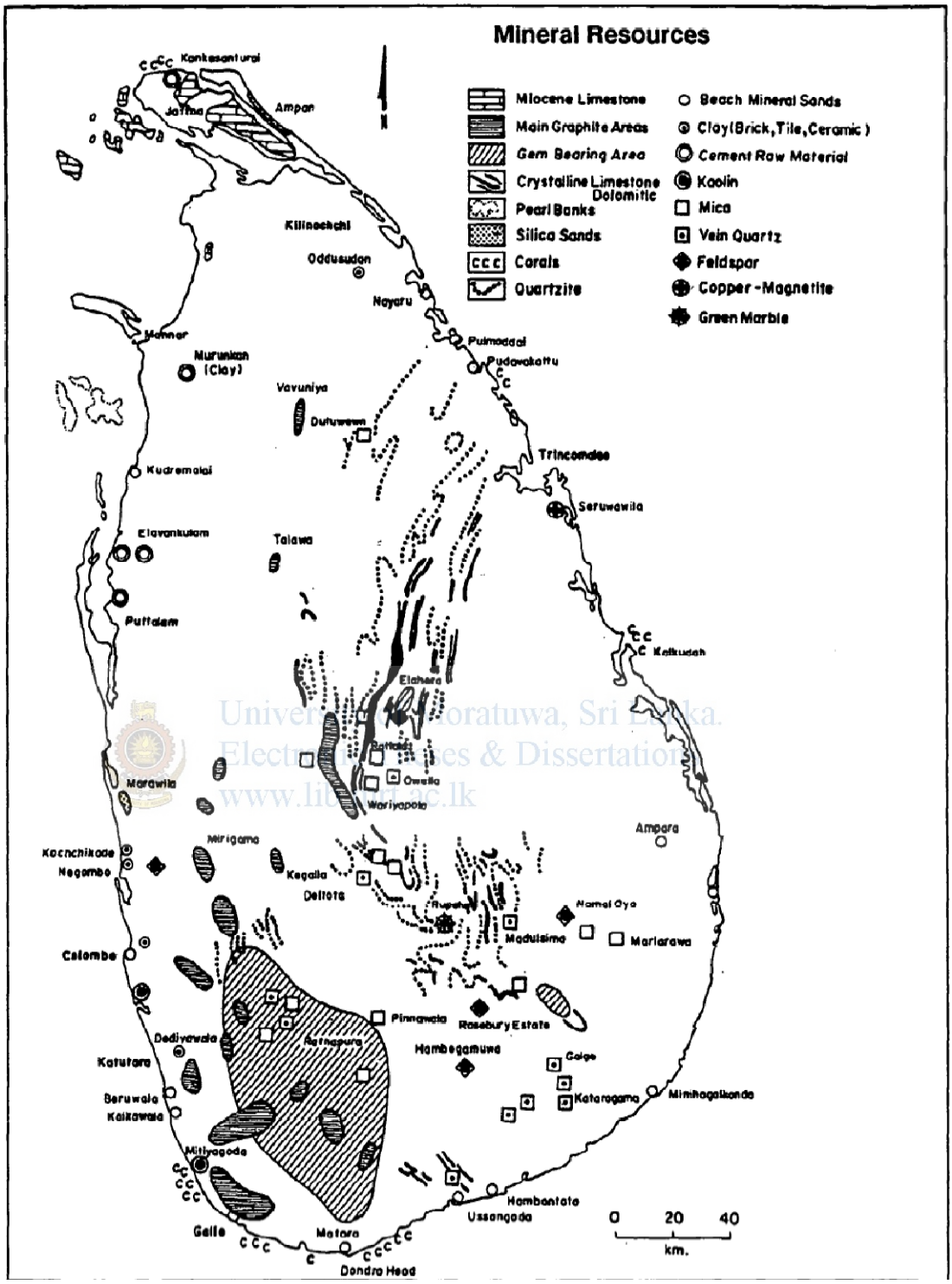
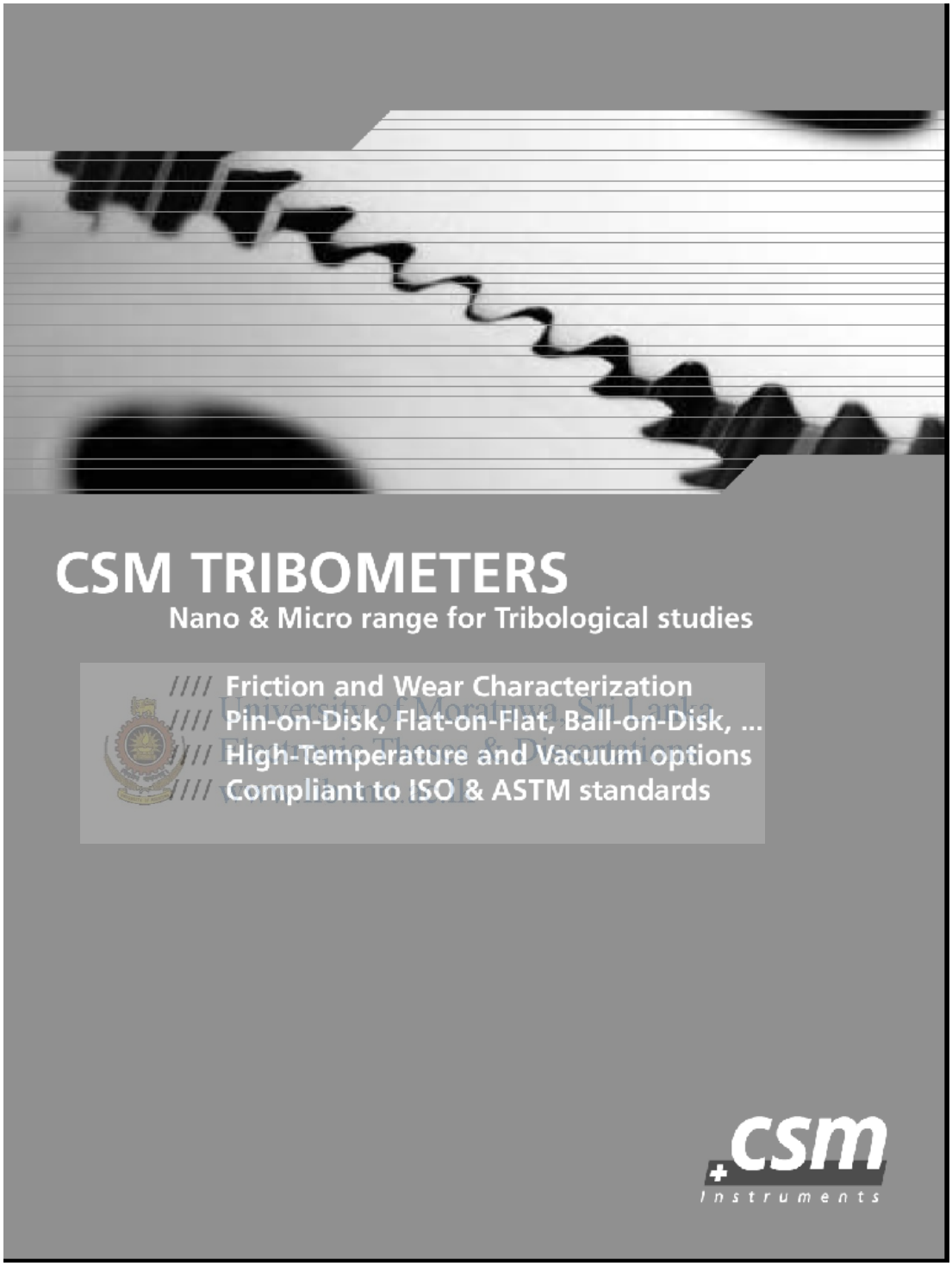
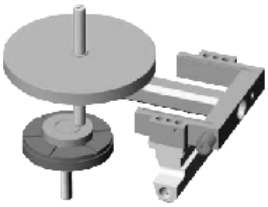
APPENDIX A: MAP OF SRI LANKAN MINERAL RESOURCE

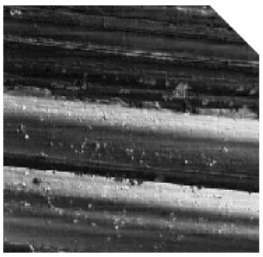


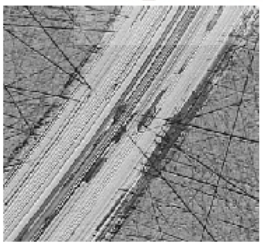
APPENDIX B: TRIBOMETER



CSM Tribometer







Introduction to the CSM Tribometers

In tribometry, a sphere, a pin or flat is loaded onto the test sample with a precisely known force. The pin is mounted on a stiff lever, designed as a frictionless force transducer. The friction coefficient is determined during the test by measuring the deflection of the elastic arm. Wear coefficients for the pin and disk materials are calculated from the volume of material lost during the test. This simple method facilitates the study of friction and wear behaviour of almost every solid state material combination with or without lubricant. Furthermore, the control of the test parameters such as speed, frequency, contact pressure, time and environmental parameters (temperature, humidity and lubricant) allows simulation of the real life conditions of a practical wear situation.

Tribometers are unique instruments designed for ultra high precision force measurement. They can conduct both linear reciprocating and rotating modes. One important feature of all CSM Tribometers is that the experiment stops automatically when the coefficient of friction reaches a predefined threshold value or when a specified number of cycles is reached. Also, the tribometer is supplied with an enclosure so that controlled atmospheres of varying humidity or composition can be used. Specialized versions of the Tribometer have been developed for high & low temperature operations, reciprocating motion and high vacuum testing. The CSM Tribometers can be equipped with a depth measuring sensor for real-time display of depth information which is important in studying the time dependent wear properties. Furthermore, an electrical conductivity option allows testing of electrical insulation of coatings.

Features of the CSM Tribometers

> High Resolution attained with unique frictionless force sensor design
> Easy and automated calibration procedures
> High-precision feedback controlled motor motion
> Precisely calibrated instrument for friction and wear
> Linear and Rotating sample displacement
> Sample Heating Option (up to 1000°C)
> Automatic switch off at friction coefficient threshold or total number of cycles
> Tests compliant to ASTM G99 & DIN 50324
> Tests in liquids, controlled humidity or inert gases within Plexiglas enclosure
> Continuous wear depth measurement (optional)
> Continuous electrical contact recording (optional)
> Precision engineered in Switzerland by CSM.

Linear Reciprocating Tribometer

The Linear Tribometer reproduces the reciprocating motion typical of many real world mechanisms. The instrument measures a friction coefficient for both the forward and backward displacement of the stroke and the software generates data on Hertzian pressure, static partner and sample wear rates. The reciprocating technique is also very useful for studying the variation over time of the static coefficient of friction - as opposed to the dynamic coefficient measured with the Pin-on-Disk configuration. Most contact geometries can be reproduced including Pin-on-Plate, Ball-on-Plate and Flat-on-Plate (others on request). The Linear Tribometer can be equipped with a heating and cooling plate for testing under a wide variety of temperatures.

Vacuum Tribometers

All CSM Instruments Tribometers are also available in a high vacuum configuration. This fully automated instrument allows perfect control of tribological conditions.

Electrical contact resistance (option)

The electrical contact option is a useful measurement when variations of conductivity could be observed in a coating/substrate system.
For example, the difference of conductivity between a coating and a substrate can be detected and allows determination of the rupture of the coating during a wear test.

Depth measurement (option)

The depth of the pin or ball in contact with the sample can be continuously monitored during a Tribometer test. The wear depth measurement records the vertical displacement of the arm during the test.

CETR Multi Contact Tribometer (CETR-MC)

Description

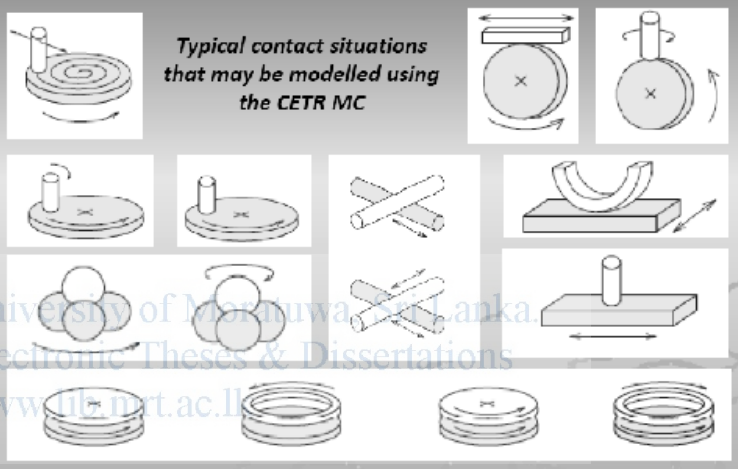
*The CETR-MC is a state-of-the-art **Tribological Station** with interchangeable modules allowing it to perform many tests, either derived from the standards (4 balls, Falex, Timken, SRV) or with more complicated contact situations. It is possible, for example, to perform tests at various Rolling-to-Sliding ratios or to slide creating spiral tracks while keeping a constant linear speed...*

*In addition, the CETR is equipped with many **complementary sensors** allowing a perfect understanding of the phenomena taking place during the tests: **Acoustic Emission (AE), Electrical Contact resistance (ECR) or even a micro displacement capacitance sensor** to monitor the wear as the test proceeds.*

This machine is our most versatile piece of equipment for modelling any contact situation in terms of geometry, speed and pressure that our customers may present to finally develop an adequate solution to their problem.

Conditions

Typical contact situations that may be modelled using the CETR MC



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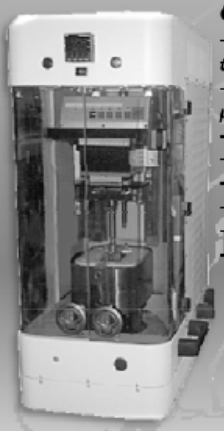
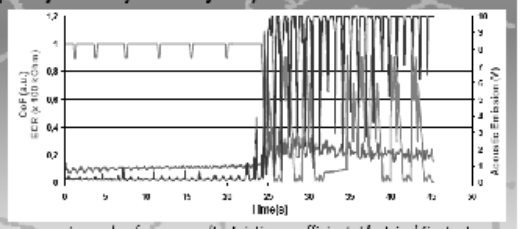


Characteristics :

- *6D Force-Torque sensor: Torque & Force on X,Y and Z axis (0,1 to 20N.m, 10 to 1000 N)*
- *Fully programmable , fully computer controlled (speeds, forces, positions)*
- *Position or Force servo-control system.*
- *High Frequency Multichannel Acquisition*
- *Contact Acoustic Emission*
- *Electrical Contact Resistance*
- *Wear quantification by means of a capacitive sensor*
- *...*



Example of some results: Friction coefficient; Electrical Contact Resistance and Acoustic Emission

APPENDIX C: TIMKEN TEST RIG

FALEX TIMKEN Test Rig

The Falex Timken Extreme Pressure Test Rig is one of the first commercially manufactured and most widely recognized testers for evaluating the load carrying capacity of extreme pressure lubricants. Originally developed in the 1930's by The Timken Company, this tester evaluates fluid lubricants and greases containing extreme-pressure additives.

Manufactured by Falex Corporation since 1982, the Falex Timken Test Rig is supplied as a complete system to conduct ASTM Standard Test Methods D2509 and D2782.

Improvements include controlled rate test load and mechanical grease feeder systems, a test fluid recirculation system with temperature control, and an automatic fluid flow interrupter. Optional accessories include a variable speed motor and reservoir cooling system to improve versatility and performance.

STANDARD TEST METHODS

ASTM D 2509 - Standard Test Method for Measurement of Load-Carrying Capacity of Lubricating Grease (Timken Method)

ASTM D 2782 - Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (Timken Method)

APPENDIX D: COMMERCIAL SIEVE MESH DIMENSIONS

Commercial Sieve Mesh Dimensions

Sieve size	Opening	Standard Mesh		Tensile Bolting Cloth			Mill Grade			Market Grade		
(mm)	(in)	US	Tyler	Mesh	Opening	Wire	Mesh	Opening	Wire	Mesh	Opening	Wire
11.2	.438	7/16"	-	-	-	-	2	.466	.054	2	.437	.063
6.3	.250	1/4"	-	-	-	-	3	.292	.041	3	.279	.054
5.6	.223	3.5	3.5	-	-	-	4	.215	.035	4	.2023	.0475
4.75	.187	4	4	-	-	-	-	-	-	4	.187	.063
4.0	.157	5	5	-	-	-	5	.168	.032	5	.159	.041
3.35	.132	6	6	-	-	-	6	.139	.028	6	.132	.0348
2.80	.110	7	7	-	-	-	7	.115	.028	7	.108	.035
2.36	.0937	8	8	-	-	-	8	.100	.025	8	.0964	.0286
2.0	.0787	10	9	-	-	-	9	.088	.023	10	.0742	.0258
1.85	-	-	-	-	-	-	10	.080	.020	11	.073	.018
1.7	.0661	12	10	14	.062	.009	12	.065	.018	12	.0603	.023
1.4	.0555	14	12	16	.0535	.009	14	.054	.017	14	.051	.0204
1.18	.0469	16	14	18	.0466	.009	16	.0465	.016	16	.0445	.0181
1.04	-	-	-	20	.0410	.009	-	-	-	-	-	-
1.0	.0394	18	16	22	.0380	.0075	18	.0406	.015	18	.0386	.0173
.85	.0331	20	20	24	.0342	.0075	20	.0360	.014	20	.034	.0162
.787	-	-	-	26	.0310	.0075	22	.0320	.0135	-	-	-
.71	.0278	25	24	28	.0282	.0075	24	.0287	.013	24	.0277	.014
.681	-	-	-	30	.0268	.0065	26	.0275	.011	-	-	-
.63	-	-	-	32	.0248	.0065	28	.0275	.010	-	-	-
.60	.0234	30	28	34	.0229	.0065	30	.0238	.0095	-	-	-
.541	-	-	-	36	.0213	.0065	32	.0223	.009	-	-	-
.50	.0197	35	32	38	.0198	.0065	34	.0204	.009	30	.0203	.0128
.47	-	-	-	40	.0185	.0065	36	.0188	.009	-	-	-
.465	-	-	-	42	.0183	.0055	38	.0178	.0085	-	-	-
.437	-	-	-	44	.0172	.0055	-	-	-	35	.0176	.0118
.425	.0165	40	35	46	.0162	.0055	40	.0165	.0085	-	-	-
.389	-	-	-	48	.0153	.0055	-	-	-	40	.0150	.0104
.368	-	-	-	50	.0145	.0055	-	-	-	-	-	-
.355	.0139	45	42	52	.0137	.0055	45	.0142	.008	-	-	-
.33	-	-	-	54	.0130	.0055	-	-	-	-	-	-
.323	-	-	-	58	.0127	.0045	-	-	-	-	-	-
.31	-	-	-	60	.0122	.0045	50	.0125	.0075	-	-	-
.30	.0117	50	48	62	.0116	.0045	55	.0112	.007	-	-	-
.282	-	-	-	64	.0111	.0045	-	-	-	50	.0110	.0090
.27	-	-	-	70	.0106	.0037	-	-	-	-	-	-
.26	-	-	-	72	.0102	.0037	-	-	-	-	-	-
.25	.0098	60	60	74	.0098	.0037	60	.0102	.0065	-	-	-
.241	-	-	-	76	.0095	.0037	-	-	-	-	-	-
.231	-	-	-	78	.0091	.0037	-	-	-	60	.0092	.0075
.224	-	-	-	80	.0088	.0037	-	-	-	-	-	-
.212	.0083	70	65	84	.0084	.0035	-	-	-	-	-	-
.20	-	-	-	88	.0079	.0035	-	-	-	-	-	-
.193	-	-	-	90	.0076	.0035	-	-	-	-	-	-
.18	.0070	80	80	94	.0071	.0035	-	-	-	80	.0070	.0055
.165	-	-	-	105	.0065	.0030	-	-	-	-	-	-
.15	.0059	100	100	120	.0058	.0025	-	-	-	100	.0055	.0045
.125	.0049	120	115	145	.0047	.0022	-	-	-	120	.0046	.0037
.106	.0041	140	150	165	.0042	.0019	-	-	-	150	.0041	.0026
.090	.0035	170	170	200	.0034	.0016	-	-	-	180	.0033	.0023
.075	.0029	200	200	230	.0029	.0014	-	-	-	200	.0029	.0021
.063	.0025	230	250	-	-	-	-	-	-	250	.0024	.0016
.053	.0021	270	270	300	.0021	.0012	-	-	-	270	.0021	.0016
.045	.0017	325	325	-	-	-	-	-	-	325	.0017	.0014
.038	.0015	400	400	-	-	-	-	-	-	400	.0015	.0010
.025	.0010	500	-	-	-	-	-	-	-	500	.0010	.0010
.020	.0008	632	-	-	-	-	-	-	-	635	.0008	.0008

APPENDIX E: TIME INTERVALS OF NANO/SUB MICRON GRINDING

Ball Size	RPM	Time(min)	Subtotal of time
5mm	1000	4	
	1000	5	
	1000	5	
	1000	5	
	1000	10	29
3mm	1000	3	
	900	3	
	900	3	
	900	3	
	950	3	
	950	3	
	950	3	
	950	3	24
1mm	900	3	
	900	2	
	950	3	
	950	3	
	950	3	
	950	3	17
0.5mm	950	3	
	950	3	
	950	3	
	950	5	
	950	5	
	950	5	
	950	5	
	950	5	34
Grand Total of Time			104