

WEAR NEWS

Volume 9, Number 4

Spring 2013

WEAR OF MATERIALS 2013 (WOM)

This is the premier materials/tribology conference in the world. It is held every two years and this 19th WOM was held in Portland, Oregon from April 14 to 18. What sets this conference apart from other tribology events is the emphasis on the materials aspects of friction, wear, and erosion. This conference was attended by about 300 delegates from at least 20 countries. There were 168 formal papers, at least 100 posters, 6 keynote speakers and a commercial exhibit of seven companies.

There were parallel sessions over four days and the session's topics varied from erosion of steel to biotribology. The following is my categorization of the papers that were presented.

Abrasion	Friction Materials
Rolling Wear	Electrical Contacts
Bearings	Biotribology
Non-ferrous alloys	Polymers/Composites
Run-in	Surface Engineering
Simulation & Modeling	Cemented carbides
Cast Irons	Lubrication
Ceramics	Cermets
Wear Testing	Fretting

There appeared to be a trend away from abrasion as the most popular form of wear. Surprisingly, sliding friction is emerging from the shadows of obscurity; this is probably because of the "energy reduction" theme that currently controls funding sources. The Polymer/Composite interest is probably also a part of the reduced-energy emphasis. Another conclusion from our informal

analysis is that tribocorrosion is gaining importance. There were also twenty papers in the conference on biotribology. There is still much interest in joint tribology and all health-related research is popular since health care is now the biggest "industry" in the USA and many other countries.

Rolling contact fatigue (RCF) appeared to be a bit light in research effort and this is somewhat surprising since the USA and other countries are forcing electricity producers to make 20% of their power from free energy by 2030. Workers in the field report that current wind machines fail within the first few years of their advertised 20-year life date due to rolling contact fatigue of their rolling element bearings and gears. Steel and bearing companies are trying to invent new steels for this application but it is a slow process.

The six keynote speakers covered a range of topics.

Bikrasjit Bacu Tribology of Ceramics

Mitjan Kalin Tribology of Non-oxide Ceramics

Michael Mosites Molecular Dynamics of
Diamond and DLC

Ken Ludema Reflections on David Tabor

Ian Hutchings Review of David Tabor's
Work on the Science of
Hardness Testing.

Ali Erdemir The Next Generation of Wear Coatings for Lubricated Sliding

Phil Shipway Wear of Cemented Carbides

The 2013 WOM was chaired by Somuri Prasad of Sandia National Laboratories (USA) and the chair of the 2015 WOM conference will be Peter Filip, Southern Illinois University Carbondale (USA). It was announced that the 2015 WOM will be in Toronto, Canada. Also announced at the conference: Ian Hutchings is stepping down as editor-in-chief of WEAR (after 14 years) and he will be replaced by co-editors-in-chief, Peter Blau of ORNL in the USA and Prof. Phillip Shipway of the University of Nottingham in the UK.

Overall the 2013 WOM was a great event. The subjects were appropriate, the meeting rooms were better than most, and the city of Portland was a model for urban living. It would be as big as Chicago if it ever stopped raining. The many people who contributed to the success of this conference are to be congratulated on a job well done.

Ken Budinski (Bud Labs)

68th ANNUAL MEETING AND EXPOSITION STLE 2013

The Society of Tribologists and Lubrication Engineers held their major event of the year from May 5 to 9 in Detroit at the Renaissance Center. There were more than 300 papers presented, about 50 posters and 80 exhibits. Attendance was up to 1,340 by the conference luncheon on Tuesday. The keynote speaker was Ken Holmberg from Finland (VTT) and he gave us the economics on the costs of friction in terms of wasted energy and related greenhouse gases: about 20% of all energy used worldwide. This is why there is a trend to lubricate our vehicle engines with oils that have the

consistency of water – it reduces engine friction (too bad about the accelerated wear).

There were sometimes a dozen concurrent sessions for each time slot so it was impossible to cover a wide range of talks. There were lots of talks on lubrication fundamentals, on wind turbines, on engine lubrication, on wear, on tribotesting, and on nanotechnology; people are still trying to make oils better with nanoparticles. Biotribology did not seem to be as popular as in previous conferences and I saw no papers on abrasive wear. Nothing popped out as new and revolutionary in lubricating oils and lots of people are still doing research on additives. Engine and other device manufacturers are using DLC coatings on critical components for wear and friction reduction, but many additive packages do not work with these coatings; additives like ZDDP rely on surface chemical reactions and the DLC coatings are inert compared to cast iron. I also learned that typically 10% of a motor oil is additives but additives only make up about 2% by volume in hydraulic fluids.

Overall, the STLE meeting has become the place for tribologists to be seen. There is worldwide representation and the format allows many opportunities for networking – selling products and projects. The venue was impressive, but taxing. Talks were on 3 floors and getting from one floor to another was a major pain. Needless to say, Detroit lived up to its reputation as a destroyed American City. One does not venture out after dark and the Renaissance Center is the only gathering place still intact. Most of the city is abandoned factories and houses. The main street, Woodward Avenue, is in such a need of repair that it is unsafe to use wheeled vehicles on it. Only off-road vehicles and track-driven vehicles can safely make it over the roadway crevasses.

They appear to be trying to fix the place but because the auto manufacturing companies left the city there is no reason (or money) to fix it. There are no jobs for the people. It was kindly for STLE to try to inject a modicum of life into the old girl.

She was wonderful when I worked there in the sixties.

Ken Budinski (Bud Labs)

ASTM G2 FRICTION AND WEAR ACTIVITIES

The Spring 2013 ASTM G2 Committee on Wear and Erosion had virtual meetings (phone and computer) on June 17 and 18 chaired by Scott Hummel (Lafayette College) and facilitated by the G2 Staff Manager Alyson Fick.

The following is a synopsis of the meeting:

Non Abrasive Wear Activities:

Nick Randall (CSM) chaired the subcommittee meeting from Switzerland. Nick reported that Scott Hummel is developing a precision and bias statement for the ASTM G 196 galling test. He also must conduct interlaboratory tests to keep the standard on the books. Both are in process. Scott also reported that he is revising the G 98 galling test to require a hole in the button specimen and three test replicates. Nick Randall will contact Margaret Stack (U of Strathclyde) to determine if she will review the G 119 test on wear/erosion synergy. This document is in line for reapproval. The G 137 block on ring test for plastics is also requiring review. Scott will ask Ray Bayer (Consultant) to do this as well as the G 176 plastic wear test.

Nick Randall is revising the ASTM G 133 reciprocity test to allow a low-load test option. He will draft a strawman procedure for the next meeting.

Greg Dalton (Tribsys) chaired a work group meeting on the twist compression test. He reported that there are 11 users that perform an estimated

500 to 1000 tests per week and that they want a standard test method. Most users are lubricant additive manufacturers. They vary additive concentrations and types and use the test to gage results. Greg will rewrite the original ballot such that any lab can run it. He will ballot at the subcommittee level before the next meeting.

Ken Budinski (Bud Labs) reported that he will try to get test specimens to four labs by the end of the summer to get a second round of interlaboratory tests on the ASTM G 204 fretting test.

Abrasive Wear Activities

Brian Merkel (Nanosteel) chaired the abrasive subcommittee meeting. He reported the following assignments for standards review and reapproval.

G 81 Jaw Crusher – Brian Merkel (OK for reapproval)

G 105 Wet rubber wheel abrasive – Troy Le Valley (Falex)

G 132 Pin Abrasion – Scott Hummel (completed OK for rebalot)

G 75 Miller number – Jim Miller (Whiterock Engineering) (OK to ballot)

G 174 Loop abrasion – Ken Budinski(OK to rebalot)

Staff Manager, Allyson Fick, reported that the B611 ballot received 4 negatives and did not meet the 90% affirmative votes in balloting. Ken Budinski will revise it to address negatives and rebalot (ballot #8)

Alan Jaenecke (Taber) reported that he revised the title of the G 195 Taber Abrader test to delete “double head rotary platform”. Alyson Fick said that the “Taber” name could not be in the title unless there were no other manufacturers (and there are “knock-offs” out there). The standard will be rebaloted with a revised title.

Troy LeValley (Falex) is chairing a task group to convert the rubber wheel on the G 65 dry sand rubber wheel abrasion test from chlorobutyl to neoprene. Six labs have volunteered to participate. Each lab will test D2 and H13 tool steels with the new neoprene wheels and compare their results with existing data in the standard appendix. These tests are to take place before the fall 2013 meeting.

Friction Activities

Chair Ken Budinski (Bud Labs) conducted a discussion on negatives on the G 182 rolling friction ballot. A vote was conducted to find a negative persuasive and the standard will be withdrawn and reballoted with the precision and bias statement revised to include this wording: "there is no absolute value of friction since it is a product of a couple and tribosystem, therefore, the magnitude of the bias cannot be determined." All negatives on the G 115 ballot were voted persuasive and the proposed appendix will be removed and the standard will be balloted for reapproval as originally approved.

Also G 143, 164 and 194, will be balloted for reapproval without change.

A new business item that was discussed was the use of the slope of the friction force vs. normal force graph as the measure of the coefficient of friction for a particular couple in a particular tribosystem. Ken Budinski will write an article for Standardization News on this.

Terminology Activities

Chair Peter Blau (ORNL) reported on some balloted terms and suggested to defer detailed discussion to the next face-to-face meeting.

NOTE: Wear News is the informal account of selected tribology events and the activities of the ASTM G2 Committee on Wear and Erosion.

Contributed tribology articles and comments are welcome. Send them and other inquiries to:
Ken Budinski - Bud Labs, 3145 Dewey Avenue Rochester, NY 14616 (USA)

Data Acquisition Activities

Chair Greg Dalton reported that a work item exists to combine the G 118 data format standard with the G 190 wear test selection guide. Progress on this has been limited.

Scott Hummel suggested that the G 118 be withdrawn and G 190 be reballoted with the substance from G 118 included. G118 will be immediately balloted for withdrawal by Greg Dalton.

Erosion Activities

G2 Committee chair Scott Hummel chaired the meeting and he reported that the G 76 solid particle erosion test was balloted and reapproved after some negatives were withdrawn. Jeff Smith reported on a new high-temperature solid particle erosion test method. The document was sent to a number of reviewers and interlaboratory tests are in progress. A ballot is expected in the summer of 2013.

Miscellany:

Next Meetings:

November 4 & 5, 2013 - ASTM Headquarters (includes 50-year celebrations)

May 18-22, 2014 with STLE - Buena Vista Florida

December 7-11, 2014 - San Diego CA with D2

Future Tribology events – see attached (compliments of Peter Blau ORNL).

Tribology events calendar – Courtesy of ASTM Committee G-2 on Wear and Erosion

16 – 18 Sep	Tribology Course – Cambridge UK	Institute for Manufacturing, 17 Charles Babbage Road Cambridge, UK CB3 0FS; T: +44 (0) 1223 766141 Dr. Michel FILLON, CNRS Director of Research, Tel : +33.5.49.49.65.	http://www.ifm.eng.cam.ac.uk/events/tribology/ E: ifm-events@eng.cam.ac.uk michel.fillon@univ-poitiers.fr
17 – 18 Sep	FUTURESCOPE – Friction reduction in journal and thrust bearings – Poitiers, FRANCE		
6 – 9 Oct	SAE Brake Colloquium – Jacksonville, FL	Contact: Melissa Jena, Project Manager, Engineering Events Development & Mgmt; tel. 724-772-4008	http://www.sae.org/events/bcae/ title="SAE 2013 Brake Colloquium & Exhibition - 31st Annual"
27 – 31 Oct	ASM Mats Sci and Tech (MS&T 2013) – Montreal QC, CANADA*	Special session on "Materials Tribology: Fundamentals, Applications and Solutions"	http://matscitech.org
27 Oct – 1 Nov	60th Am. Vac Soc.Int'l. Symp. – Long Beach, CA	Special topic "Tribology" session (main focus on nano-tribology and fundamental aspects). Contact: Dr. Douglas L. Irving, Dept. of MSE, NC State Univ.(tel.): 919-515-6154	http://www.avs.org
4 Nov	ASTM G2 Committee Meeting – W. Conshohocken, PA (ASTM Head quarters)	Contact: Alyson Fick, ASTM Intl, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; tel. 610-832-9710 Monday this time instead of Thurs-Fri	E-mail: afick@astm.org http://www.astm.org
Calendar year 2014			
21 – 23 Jan	19th Intern'l Colloq. on Tribology: Industrial and Automotive Lubr. – Ostfildern/Stuttgart, GERMANY	Zeh, Andrea, secretariat	E-mail: Andrea.Zeh@tae.de www.tae.de/tribology
9 – 14 Apr	4th International Symposium on Tribo-Corrosion – Glasgow UK	Details pending. Contact: Professor Margaret Stack, University of Strathclyde, Glasgow G4 0LT UK; Tel: 44 141 548 3754	E-mail: margaret.stack@strath.ac.uk
to be set	ASTM G2 Committee Meeting – W. Conshohocken, PA (Head quarters)	Contact: Alyson Fick, ASTM Intl, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; tel. 610-832-9710 (in conjunction with D02) – Monday this time instead of Thurs-Fri	E-mail: afick@astm.org http://www.astm.org
6 – 8 May	EURO Friction, Wear, and Wear Protection 2014 – Karlsruhe GERMANY	Deutsche Gesellschaft für Materialkunde (DGM) e.V. (German Soc. of Materials Science) Senckenberganlage 10, D-60325 Frankfurt am Main, Germany; T: +49-69-75306-750	E: dgm@dgm.de www.dgm.de
18 – 22 May	STLE Annual Meeting & Exhibition – Lake Buena Vista, FL	Society of Tribologists and Lubrication Engineers, 840 Busse Highway, Park Ridge, IL 60068-2376; Tel (847) 825-5536	www.stle.org
10-11 Dec	ASTM G2 Committee Meeting – San Diego, CA	Contact: Alyson Fick, ASTM Intl, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; tel. 610-832-9710 (with D2)	E-mail: afick@astm.org http://www.astm.org
to be ann.	20th Intl Conference on Wear of Materials	Location and details to be announced at WOM 2013	
Calendar year 2015			

Tentative meeting dates: Please check meeting organizers to confirm. Details of ASTM meetings may change based on ASTM G2 committee discussions.

Tribology Events Calendar

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