Wear News

Volume 9, Number 5 **Fall 2013**

World Tribology Congress
September 8 -15, 2013

This conference is held every three years and it is sponsored by numerous technical societies. It seems to be the product of Peter Jost, the president of the World Tribology Council, from the UK, the person with some responsibility for the invention of the word "tribology" in the 1960's. The conference was held in Torino (Turin), Italy in the skating rink built for the 2006 Olympics. The chair of the organizing committee was Prof. Terenziano Raparelli.

This conference is usually bigger than other tribology conferences: 1100 attendees, 850 papers over 5 days, 240 posters in 3 sessions. The sessions were broken into the following typical categories:

Ecotribology	Machine Elements
Biotribology	Bearings
Surface tribology	Nanotechnology
Dry friction & wear	Materials
Lubricants	Biomemetics
Tribotesting	Testing
Lubrication Fundamentals	

The first day mostly consisted of presentations of invited speakers. The Conference was opened with a talk by Peter Jost. He continued his plea for tribology workers to demonstrate the national economics of our research and results (to 9% GDP). He even proposed inviting media to tribology meetings.

Venue

Torino was the first capital of Italy (1861) and they have all of the leftover trappings of kings and related nobility. Presently, it is a factory city decreasing in size due to globalization of manufacturing (it's outsourced) but they still have a significant auto manufacturing activity (Fiat) and it's like Detroit in the early 1990's or thereabouts.

The conference was held in a 10,000-seat hockey stadium built for the 2006 Olympics. Technical sessions were held in ten rooms partitioned on what was the stadium ice. Coffee breaks, lunches, posters and the exhibit were conducted in the stadium foyer.

Plenary Lectures

With over 800 papers, it is not possible to make a global statement about the technical content, but I will present my opinions on the sessions that I attended.

Plenary Lectures – There were six and they were held during the first day. There were no competing technical sessions.

Paolo Giubellino, a physicist from Switzerland described the "ALICE" project which is a huge particle accelerator (27km in length 100m below ground). This is the EU community nuclear research facility. The speaker tried to explain hadrons, gluons, antimatter, Higgs Bosom, Fermions and quarks.

Professor Ioannides from Imperial College in the UK talked about the history of rolling element

bearings and current changes to increase fatigue life.

Professor Luo from Tsinghua University in Beijing, China showed us how China has surpassed the US in literature citations in tribology and talked about the use of molecular dynamics in tribology studies.

Professor Klaus Freidrick from Germany clarified the role of nanoparticles in plastics used for wear applications. They can significantly improve wear characteristics if you get a uniform distribution of them between reinforcing shapes. But this is not easy to do.

Professor Greg Sawyer from the University of Florida, USA was the last speaker and he recounted the results of tribotester studies conducted on the international space station.

Technical Sessions

Ecotribology – This was a new to me feature at a tribology conference and they had at least six sessions and thirty papers on the subject. I did not encounter a formal definition of "ecotribology" but the substance of the papers was to save energy (lower friction) and use renewable materials (biofuels, bio-oils, etc.).

Biotribology - There were 14 sessions (84 papers) on the tribology of people. One new to me session was on the tribology of the mouth. I always wanted to do tooth wear tests, but in one of these sessions I learned that the mechanical properties of extracted teeth degenerated rapidly after extraction (several hours) so I will have to do my studies in vivo.

Rolling element bearings - There were a lot of rolling element bearing talks from SKF Corporation. Apparently they have a big automotive wheel bearing facility in Torino and they do research at that facility. I listened to several talks about their "BEAST" computer program that allows users to design complicated bearings and see how they run at different speeds without cutting steel. It allowed inputting various tolerances and surface textures.

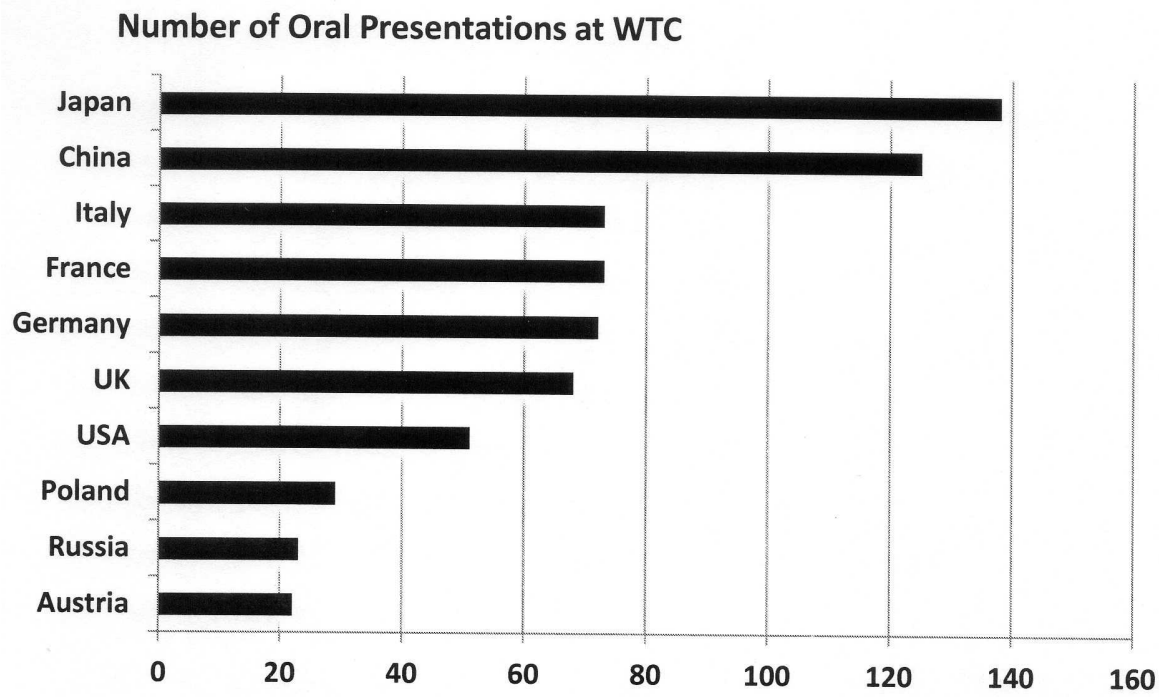
Biomemetics - There is still a lot of activity in trying to steal good ideas from nature. I learned that the Rose Beetle from Africa has learned to hop and run nicely with no lube in its joints other than the blood that flows in its legs – no cartilage, no HA molecules, no lubricine. I need to find his secret.

Others - Surface Tribology, Dry Wear, Materials, Lubricants; there were many sessions devoted to these subjects. I spent most of my time in the previous sessions so I cannot offer significant learnings from them.

Summary

Overall, the World Tribology Conference is a must-attend function because it is so universal; delegates from 50 countries attended. The top 10 countries in participants are shown in Figure 1. Japan led the largest showing, followed by China. The USA squeaked out eighth place between the UK and Poland. The exhibit was wonderful in that the exhibit area was cavernous with lots of room to wander and talk with exhibitors. Most had really fancy exhibits and several had cars and women models. There were about 40 exhibits. There was a welcome cocktail party, a gala dinner midway and a final cocktail party.

The organizers are to be commended on a great conference and their significant efforts to make everything work out. Such a huge conference is a challenge for any organization. The people of Torino were warm and helpful and the weather was beyond perfect. Thank you WTC.


Number of Oral Presentations at WTC
Japan
China
Italy
France
Germany
UK
USA
Poland
Russia
Austria
0
20
40
60
80
100
120
140
160

ASTM G 2 Friction and Wear Activities

The ASTM Committee on Wear and Erosion's fall meeting was held in conjunction with a 50th anniversary celebration on November 4 and 5 at ASTM's headquarters in West Conshohocken Pennsylvania. The meeting were arranged and facilitated by The G2 Committee Staff Manager Alyson Fick.

The following is synopsis of the meeting:

Work Group on the twist compression test

Greg Dalton (Tribsys) balloted a straw man standard on a galling test that involves multiple rotations of an annulus rider on a flat sheet metal counterface. The test is intended to simulate the galling and "pickup" that commonly occurs in drawing and forming sheet metal parts on punch presses. These steels are usually lubricated and an important application of the test is evaluating the efficacy of drawing lubricants.

The work group chair, Greg Dalton, was not present at the meeting, but those in attendance discuss the ballot and made suggestions for the next ballot. The straw man- ballot was withdrawn because of multiple negatives. Most had to do with adding test details. The straw man was deliberately written to allow a wide range of test conditions, but it was the consensus of those in attendance that new users did not have enough information to do the test. Some suggestions for the next ballot were:

1. Include a schematic of the test rig and details on motor size and force capability
2. Include engineering drawings of typical test specimens.
3. Show typical results on bare steel and lubricated steel
4. Include a friction criterion for stopping the test.
5. Specify sliding speeds, normal force and number of rotations
6. Supply details on how to apply lubricants to the sheet metal counterface.

Steve Shaffer (Bruker) offered to revise the first draft and resubmit it for ballot at the subcommittee level by Feb. 2014

Work Group on revision of ASTM G 65 to allow the use of Neoprene wheels

Troy LeValley (Falex) chairs this work group and they have been investigating changing the ASTM G 65 dry sand rubber wheel abrasion test to allow the use of neoprene rubber to replace the current chlorobutyl rubber (CBR) for the wheel that forces the abrasive against the test specimen. An interlaboratory test of six labs was conducted on the neoprene using a D2 tool steel test coupon. The coefficient of variation ranged from 0.07 to 0.15 with less than 0.1 being the goal. The test participants were of the opinion that the neoprene produced results similar to the CBR wheel. The standard will be revised to allow its use but users will have to report on which wheel they used in tests.

There was much discussion on the problems that exist on getting CBR wheels and the net effort of the work group deliberation was that john Hadjioannou (EPI) will revise the G65 standard and he will ballot it in February of 2014. Alyson Fick will investigate the availability of a research report on the task group study.

Erosion Activities

The fall 2013 meeting of the erosion subcommittee was chaired by Scott Hummel (Lafayette College). Jeff Smith Swami Swaminathan reported that they will reballot their test method on elevated temperature solid particle erosion.

Professor Soyama (Tohoku University in Japan) gave a presentation on interlaboratory tests conducted on the G 134 high pressure jet cavitation erosion test. Professor Soyama showed erosion curves for a variety of metals tested at different

labs. The reproducibility appeared to be quite good and the data from this round of tests will be incorporated in a new draft of the standard for subcommittee ballot. This test is much faster to conduct that the vibratory horn cavitation test (G 32).

Professor Soyama also showed data on how cavitating jets can peen a surface an improve fatigue life of structural members. It can serve as a replacement for shot peening and laser shock peening.

The ASTM Erosion Subcommittee has been without a Chair for the past few years. However, John Hodjioannou agreed at the Philadelphia to assume the committee chair.

Abrasion Activities

Brian Merkle (Nanosteel) chaired the abrasion subcommittee meeting. The first item of business was to resolve the negatives on the ballot of the B 611 high-stress abrasion test. This test is like the G 65 test in concept however, the test sample rubs on a steel wheel and the abrasive is 30 grit aluminum oxide suspended in a water slurry. The last ballot received two negatives. They had to do with the wording of certain parts of the method. After discussion with the negative voter, the negative was withdrawn. Thus, the standard was reapproved and reinstated.

The following standards received administrative negatives on their reapproval ballots:

G 75 Miller number slurry abrasion test

G 81 Jaw crusher abrasion test (Note: there is a test machine in use at Tampere University of Technology, Tampere Finland contact: Juuso Tervo - Pekka Siitonen Metso Mineral Co. Tampere, Finland.)

G 132 Pin-on-sandpaper drum abrasion test

G 195 Taber abrasion test

There were no comments from voters on these test methods so Scott Hummel withdrew his administrative negatives. The standards are reapproved.

Under the subject of “new Business” Troy LeValley and John Hoganeau offered to review the G 105 wet sand abrasion test for reballoting. Peter Blau (Wear Tester) said that he and Nick Randall (CSM) will review the G 171 scratch hardness test and establish a work item to add a profilometer method for measuring scratch width. They will also do an interlaboratory test.

Ken Budinski (Bud Labs) reported that the G 174 loop abrasion test has been reviewed and that it is ready for a reapproval ballot.

Troy LeValley summarized the preceding day’s task group meeting on the G 65 wheel rubber and stated that he will revise the standard to include the use of neoprene. He will also write a research report on the interlaboratory study (ILS) conducted on D2 tool steel.

Mr. Gibbons (on Webex) expressed the need for an abrasion test for welded hardfacings deposits. He offered to present a straw man to the abrasion subcommittee chair.

Data Acquisition Activities.

Scott Hummel chaired the subcommittee in the absence of Chair Greg Dalton. The status of the G118 standard on data suitable for data bases will be withdrawn and it will be combined with the ASTM G 190 guide on wear test selection. The G190 test will then be reviewed and revised to include material from the cancelled G 118 standard. No activity has occurred on this effort since the last meeting in June 2013.

Non Abrasive Wear Activities

Nick Randall (CSM) chaired the November 2013 meeting in Philadelphia. The first item discussed was negative votes on the ASTM G 98 galling test. The ballot was on a revision of the button-on-block test to make the test specimens to be the same as the new galling (G 196) test, conforming pins of annulus configuration. The negative voters voiced the opinion that changing the shape of the test specimens would void decades of published data and users want to compare new material with historic data.

It was agreed that G 98 will be left unchanged and the balloted test with new sample configuration will be reballoted as a standard with a different number and name. Scott Hummel will do the rewrite and reballot. He reported that the will also do an ILS to develop galling data with the new method. The new method eliminates the stress concentration that tis produced by the contact of a flat ended cylinder on a large flat. The new standard will not use the term "threshold galling stress".

Nick Randall reported that he had Robert wood (UK) and Stephano Mischler (Switzerland) review the G119 guide for determining synergism between wear and corrosion. Professor Wood said that it was to complex and professor Mischler said that it was not theoretical enough. It does not address the underlying electrochemical principles. Nick Randall will ask Margaret Stack (UK) to resolve the conflicting reviews and make recommendations on revision and reballoting.

Troy LeValley offered to review the G 137 Standard on plastic wear testing and the G 176 test on the use of the G 77 block on ring test on plastics. Both standards need to be reviewed for reapproval.

Nick Randall is exploring the possibility of adding a third procedure to the G 133 reciprocating pin-on- flat wear test.

Ken Budinski reported that test samples were submitted to four laboratories for a second ILS using the G 204 fretting test. Troy LeValley offered to join the ILS and he will be sent a set of test samples by Bud Labs. Ken Budinski will establish a work item for the ILS.

Friction Activities

Friction Subcommittee chair Ken Budinski reported that the G 182 rolling element bearing friction test received a negative and a comment in reapproval balloting. The negative was Scott Hummel's administrative negative and he will withdraw his negative if a change is made to add a voters comment. Ken Budinski agreed to reballot section 6.5 of the standard to show "one degree or less" as the accuracy needed in measuring the inclination angle of the inclined plane used in the test.

Ken Budinski also reported that the following standards were balloted for reapproval and all received administrative negatives:

G 115 Measuring and Reporting Friction Coefficients

G 164 Paperclip Friction Test

G 143 Capstan Friction Test

G 194 Rolling Friction Test

There were no comments received on these standards in reapproval balloting and Scott Hummel agreed to withdraw his administrative negatives on these standards and allow reapproval.

Ken Budinski reported that his proposed article for Standardization News on the use of friction force versus normal force curves for determining coefficient of friction (it is the slope) developed into a research project and the article will be written when the research is completed.

Terminology Activities

Subcommittee Chair Pete Blau reported that five terms were balloted since the last meeting:

1. Friction loop
2. Friction log
3. Biotribocorrosion
4. Friction

Negatives and comments were received on all terms. After discussing all of these terms with the meeting attendees, it was decided to reballot "friction loop" with the clarifying note removed, to permanently withdraw friction log (not a widely used term), to refer "Biotribocorrosion" to people working in the medical field and to reballot "friction" after addressing the negatives.

There was also discussion at the fall meeting on the use of graphics in definitions and removal of the term "threshold galling stress" from G 40 terms and definitions. Alyson Fick agreed to investigate the use of graphics and resolve this issue.

Miscellany

Future Meetings:

May 18-21 2014 Lake Buena Vista FL (with STLE)

Dec.7-11 2014 San Diego CA (with D2)

April 16-17, 2015 Toronto (with WOM)

Committee Officers for 2014 to 2016:

Steve Shaffer – Chair

Greg Dalton – Vice Chair

Troy LeValley – Secretary

New Chair of Erosion Subcommittee

John Hadjioannou (EPI Materials Testing Group) has been appointed Chair of the Erosion Subcommittee

Fiftieth Anniversary Celebration

The most significant part of the fall 2013 meeting at ASTM Headquarters was the 50th anniversary celebration held on the evening of November 4. One of the founders of the committee, Chuck Grennan, attended the celebration as well as the business meetings. G2 Staff Manager Alyson Fick arranged for a celebration dinner at a restaurant near STM headquarters and the dinner was sponsored by CSM Instruments, EPI Materials Testing Group, Falex Corp., WRES Inc., and another G2 founder: Frank Heymann.

Sixteen people attended the dinner and Daniel Smith, ASTM Vice President offered congratulatory remarks. Chuck Grennan also made a presentation on the early days of the committee when it was the "Committee on Egoism". "Wear " as not added to the title until the 1980's.

In addition to the dinner, Alyson Fick also had ASTM published an Anniversary Commemorative Booklet that contained details about the committee history and related limericks from Peter Blau, long time G2 officer and supporter. Attendees also received a 50th anniversary lapel pin and Frank Heymann wrote an article for Standardization News on how the committee was conceived and formed.

The anniversary celebration was a great success and all those who help make it happen are to be congratulated.

Future Tribology Conferences

Peter Blau passed out the attached Tribology Events Calendar to help workers in the field abreast of what is happened. Thank you Peter.

Note:

Wear News is the informal account of the proceedings of the ASTM G2 committee on Wear and Erosion and selected related tribology events. Contributions on tribology topics are welcome. Send them to:

Ken Budinski
Bud Labs USA
3145 Dewey Ave.
Rochester NY 14616 USA

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

18 – 22 May	69th STLE Annual Meeting & Exhibition – Lake Buena Vista, FL	Society of Tribologists and Lubrication Engr, 840 Busse Highway, Park Ridge, IL 60068-2376; Tel (847) 825-5536	www.stle.org
26 – 29 May	2nd Austrian-Indian Symposium on Matls Sci and Tribology – Wiener Neustadt AUSTRIA	AC2T research GmbH, Viktor-Kaplan-Straße 2 2700 Wiener Neustadt, Tel. +43 2622 816 00 - 210 GF Dr. Andreas Pauschitz, GF Univ.Prof. Dr. Friedrich Franek	www.tribology-events.at/austrian-india-symposium Email. office@ac2t.at
8 – 13 Jun	13th Intl Ceramics Conference (CIMTEC 2014) – Montecatimi Termi ITALY	"Symposium CC": Matl Solutions for Highly Demanding Tribological Applic., Symp. CI: Ceramic Thin Films and Coatings for Protective, Tribological, and Multifunctional Applications"	http://www.cimtec-congress.org/
22 – 24 Jun	6th Int'l Conf. on Tribology in Manufacturing Processes (ICTMP) - Darmstadt, GERMANY	Prof. Dr.-Ing. Dipl.-Wirtsch.-Ing. Peter Groche	www.ictmp2014.com
22 – 27 Jun	5th Intl Symp. on Surfactants in Tribology – Coimbra, PORTUGAL	"Surfactants in Solutions (SIS2014)" Contact: Symposium organizers: tel. + (309) 681-6479	www.uc.pt/fctuc/dquimica/sis2014 E-mail: girma.biresaw@ars.usda.gov
20 – 25 Jul	Gordon Research Conference on Tribology – Waltham, MA	Emphasis on nanotribology, soft tissues, bio-tribology, chair: Prof. Roland Bennewitz, INM -Leibniz Inst. for New Materials	www.grc.org/programs.aspx?year=2014&program=tribology
Sep (dates?)	EUROCORR 2014 – Pisa ITALY	Joint session on tribocorrosion. Contact: Prof. Pierre PONTHIAUX, Ecole Centrale Paris, Grande Voie des Vignes,92290 Châtenay – Malabry, tél : 33 1 41 13 12 44	www.eurocorr.com E-mail : pierre.ponthiaux@ecp.fr
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
		Calendar year 2015	
12 – 16 Apri.	20th Intl Conference on Wear of Materials – Toronto, CANADA	Chairman: Prof. Peter Filip, Southern Illinois University, Carbondale, IL USA.	www.wearofmaterialsconference.com http://www.wearofmaterials.org/
17 – 21 May	70th STLE Annual Meeting & Exhibition – Dallas, TX	Society of Tribologists and Lubrication Engineers, 840 Busse Highway, Park Ridge, IL 60068-2376; Tel (847) 825-5536	www.stle.org
		Calendar year 2016	
15 - 19 May	71st STLE Annual Meeting & Exhibition – Las Vegas, NV	Society of Tribologists and Lubrication Engineers, 840 Busse Highway, Park Ridge, IL 60068-2376; Tel (847) 825-5536	www.stle.org

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

ASTM Committee G02 on Wear and Erosion
Serving the engineering and tribology community since 1964

Date(s)	Meeting name - Location	Contact	URL/email
		Calendar year 2013	
27 – 31 Oct	ASM Matls Sci and Tech (MS&T 2013) – Montreal QC, CANADA*	Special session: "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" and "Surface Engineering" sessions Contact: Dr. Douglas L. Irving, NC State Univ.(O.): 919-515-6154	http://www.avs.org
4 - 5 Nov	**ASTM G2 Committee Meeting –** W. Conshohocken, PA (ASTM HQ)	***Celebration: 50th anniversary of the G2 Committee*** Contact: Alyson Fick, ASTM Intl, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; tel. 610-832-9710 Mon-Tues	E-mail: afick@astm.org http://www.astm.org
		Calendar year 2014	
6 – 10 Jan	International Nanotribology Workshop – Kerala INDIA	This workshop will also pay tribute to the life and work of Professor Sanjay K. Biswas, a cofounder of the INF, who passed away in April, 2013. Contact: W. T. Tysoe (e-mail at right)	http://nanotribology.org E-mail: wtt@uwm.edu
21 – 23 Jan	19th Intern'l Colloq. on Tribology: Industrial and Automotive Lubr. – Ostfildern/Stuttgart, GERMANY	Contact: Andrea Zeh, secretariat	E-mail: Andrea.Zeh@tae.de www.tae.de/tribology
17 – 20 Feb	ASIATRIB – 2014 – Agra INDIA	Dr. S.S.V. Ramakumar, Indian Oil R&D Center, (+91) 129 4005409; Dr, Satish Kailas VP India Tribology Soc.	E-mail: asiatrib2014@gmail.com info@tribologyindia.org; www.tribologyindia.org
21 – 24 Feb	Advances in Tribology-2014 (ICAT14) Kerala, INDIA	Prof.K.Prabhakaran Nair (Principal Coordinator); Prof. P.K. Rajendra Kumar (Coordinator); Prof. M L Joy (Co-ordinator); National Inst. of Tech., Calicut,Kerala,India	Email:icat14@nitc.ac.in www.icat14.com
9 – 11 Apr	4th International Symposium on Tribo-Corrosion – Glasgow UK	Details pending. Contact: Professor Margaret Stack,University of Strathclyde, Glasgow G4 OLT UK; Tel: 44 141 548 3754	E-mail: margaret.stack@strath.ac.uk http://www.tricorrnet.strath.ac.uk/board.htm
27 – 30 Apr	1st African Conference on Tribology – Marrakesh MOROCCO	Michel FILLON, Dr., HDR, CNRS Director of Research, Université de Poitiers, France;Tel :+33.5.49.49.65.43 Fax :+33.5.49.49.65.0	http://act2014.sciencesconf.org E-mail: : michel.fillon@univ-poitiers.fr
28 Apr – 2 May	Intl. Conf. on Metall. Coatings and Thin Films (ICMCTF) – San Diego, CA	Abstract deadline 1 October 2013	http://www2.avs.org/conferences/icmctf Abstract form: http://www.icmctf.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
11 – 14 May	2nd International Conference on Bio-Tribology – Toronto, CANADA	Dr. Philippa Cann, *Imperial College London, UK,* Conference Chair	www.biotribologyconference.com
18 – 22 May (**pending**)	**ASTM G2 Committee Meeting** – Lake Buena Vista FL (in conjunction with STLE (see below)	Contact: Alyson Fick, ASTM Intl, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959; tel. 610-832-9710 to confirm these dates or visit the ASTM website	E-mail: afick@astm.org http://www.astm.org