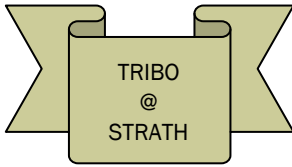


TRIBOLOGIA



Strathclyde Tribology Group

We are hosting the 4th International Tribocorrosion Conference!

Tribology Group Leader

Professor Margaret Stack

Researchers

- Dr. Shayan Sharifi
- Ghulam Rasool
- Kamran Sadiq (Editor)
- Rafee Ahamed
- Hamish Macdonald

Undergraduate

- Jamie Sloan
- Andrew Hayes
- Lewis Shearer

The 4th International Tribocorrosion Conference is coming to Glasgow for the first time ever. It was first held in Hyderabad, India in 2006, then in Wiener-Neusdat, Austria the following year, and most recently Atlanta, USA.

This 4th International conference will focus on Tribocorrosion: Fundamentals to Technology Transfer and Impact.

Papers on fundamental aspects are solicited together with contributions on how materials degradation prediction can be addressed through tools such as mapping, modeling and design. Scientific topics include the tribocorrosion of coatings and thin films, sliding-corrosion, fretting-corrosion, microabrasion-

corrosion, tribocorrosion-models, bio-tribo-corrosion (dentistry and orthopaedics), nano-corrosion, surface modifications (nanotube and texturing) to improve tribocorrosion resistance for the biomedical and industrial applications.

Our first journal (see back page) will be launched during the Conference, an inaugural board meeting for the journal is to be held on the 11th April

2014.

A poster session and prizes for best presentation and best paper will also take place during the event.

Papers from the conference will be published as a journal special issue.



George Square, Glasgow

Inside this issue:

- We are hosting the 4th International Tribocorrosion Conference! **1**
- £1.01 MILLION 3-year sponsorship awarded by the EPSRC **1**
- Ghulam's time at the International Islamic University of Malaysia **2**
- Tribocorrosion in Marine Renewable Energy **3**
- Recently published articles from our current researchers! **3**
- New Journal of Bio- and Tribocorrosion Launched! **4**

£1.01 MILLION 3-year sponsorship awarded by the EPSRC

The Group is pleased to announce a £1.01 million three-year sponsorship on tidal energy by the EPSRC Marine Grand Challenges 2 scheme, for a Tribology and Tribocorrosion research related project to Marine Energy (Tidal Energy).

Professor Stack leads the project, which is a consortium including internationally leading groups at Newcastle and Southampton universities. There is strong support from industrial partners Marine Current Turbines, IT Power Ltd, Nautricity Ltd, Mott

MacDonald, and Renewable Energy Systems Ltd.



Ghulam's time at the International Islamic University of Malaysia



Ghulam Rasool is a final year PhD student

Ghulam Rasool shares his experiences with us about his time spent researching in Malaysia at the International Islamic University Malaysia during the summer of 2013.

The people at International Islamic university Malaysia are very friendly and cooperative. I gain lot during my visit at IIUM. I did lot of work over there. The university has lab. full of testing equipment. I did study of the function and operation of CSM ball-on-disk tribometer at IIUM has enabled me to understand how the existing dry sliding wear Pin-On-Disk tribometer at the University of Strathclyde may be adapted for tests in wet conditions. This is to facilitate the evaluation of wear resistance of titanium and titanium base titanium carbide coating and to develop tribocorrosion maps.

In IIUM, knowledge was acquired of the computer controlled CSM ball-on-disk tribometer and accurate test results and knowledge were obtained regarding dry sliding wear behaviour of uncoated and coated materials.

Other insights gained include coating techniques, all processes from substrate surface preparation, pre powder deposition processes, and TIG melting process used for titanium carbide composite coating on titanium substrate.

As there is no computer controlled high temperature tribometer in Strathclyde, the visit enhanced the understanding of what this capability may bring to the University in future collaborative grant applications. Collaborative discussions were also held with PhD student in Malaysia who is also working in this field, in the collaborative agreement which has been developed between IIUM and Strathclyde.

Through using different equipment such as sur-

face grinding machine, metal cutter, drilling machine, polishing machine, optical microscope, SEM, EDX, surface roughness checking machine, EDM wire cut and CSM ball-on-disk tribometer I have added to my experience in this field.

The visit gave me an awareness of the latest and most appropriate apparatus necessary to improve the research capability and to get more reliable experimental results, for wear testing at room and elevated temperatures.

I would like to pay tribute to the personnel in IIUM who facilitated my stay in Malaysia and the EPSRC Global grant for sponsorship of this study visit.

“The visit gave me an awareness of the latest and most appropriate apparatus necessary to improve the research capability and to get more reliable experimental results

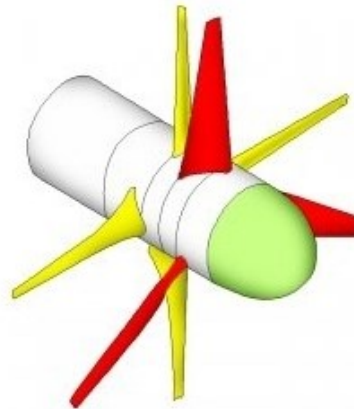


The International Islamic University Malaysia main library

Tribocorrosion in Marine Renewable Energy

As part of the £1.01 million EPSRC Supergen sponsorship on tidal energy, Rafee Ahamed, 1st year PhD student, begins work investigating some fundamental issues relating to the success of tidal turbines.

The object of his work will be to study the Tribological and Tribo-Corrosion mechanisms of materials to be in tidal turbines. The work will involve wear and electro-chemical testing, morphological characterization using advanced microscopy techniques, and construction of Tribo-Corrosion maps. The materials used will include carbon steel and a range of polymer composites, leading to the development of hybrid and smart materials for such conditions. This research comprises testing of materials on slurry impingement erosion jet rig and construction of tribo-corrosion maps for the materials under such conditions



CoRMaT is a patented contra-rotating turbine manufactured by Nautricity

“Studying the tribological and tribo-corrosion mechanisms in tidal turbines”

Tribology Group and Wind Energy CDT join forces

Hamish Macdonald's project bridges the expertise of the Tribology Group and the EPSRC funded Wind Energy CDT based at Strathclyde.

The typical wind turbine is subjected to numerous environmental conditions over the course of a 20+ year lifespan. Factors such as salinity, UV, heat, moisture and airborne particulates, can all contribute

to the damage of wind turbine blades. This can result in the loss of the aerodynamic profile, which can reduce the annual energy production of the turbine, and delamination of the blade's composite layers. With the increasing number of wind farms being proposed in environmentally challenging offshore environments, the risk of damage to the blade is

also amplified. The project explores these influences through parametric analysis and modelled by experimental and numerical means. Particular focus will be placed on the precise damage mechanisms associated with erosion of the leading edges of turbine blades due to rain and hailstones.



Offshore wind turbines

Recently published articles by the research team!

1. Tribo-corrosion of stainless steel in artificial saliva : application to dental implants. Holmes Duncan, Sharifi Shayan, Stack Margaret, Tribology International (2014)
2. Wear maps for TiC composite based coatings deposited on 303 stainless steel. Rasool Ghulam, Stack Margaret, Tribology International (2014)
3. A comparison of the tribological behaviour of Y-TZP in tea and coffee under micro-abrasion conditions. Sharifi Shayan, Stack Margaret, Journal of Physics D: Applied Physics Vol 46, No. 40, (2013)
4. Micro-abrasion of Y-TZP in tea. Sharifi Shayan, Stack Margaret, Stephen L, Li Wang-Long, Wang Moo-Chin, WEAR Vol 297, No. 1-2, pp. 713-721 (2013)

TRIBOS

Tribology at Strathclyde

Dept. of Mechanical and Aerospace Engineering
University of Strathclyde
James Weir Building
75 Montrose Street
Glasgow, UK

Phone: +44 141 548 3754
Fax: +44 141 552 5105
E-mail: margaret.stack@strath.ac.uk

Tribology Group

We're on the Web!

www.tricor.net.strath.ac.uk

The Tribology Group at Strathclyde is concerned with developing maps for particulate erosion, micro-abrasion, sliding wear and cavitation, in corrosive environments, both at room and at elevated temperatures. It has an established track record in mapping slurry erosion-corrosion of coated and uncoated materials, solid particle erosion of MMCs at elevated temperatures, and for erosion-corrosion of new generation "superlattice" coatings. These maps may indicate a wide range of phenomena i.e. the mechanism of wear, the extent of wastage and interaction between the processes, all components of tackling the complex area of Tribology from the perspective of the Mechanical Engineer. Over 150 papers (114 journal papers) have been generated based on this work to date.

New Journal of Bio- and Tribo-Corrosion Launched!

We are very pleased to announce the new Journal of Bio- and Tribo-Corrosion edited by Profs. Margaret Stack, Mathew Mathew and Yu Tian, which will be published by Springer! The journal will be the first to publish papers exclusively in this rapidly growing area, covering all aspects of tribo-corrosion, ranging from biological environments to green energy technologies to bio-degradable metals and composites. A broad range of subjects will be covered such as corrosion, tribo-corrosion of coatings, metallic materials, and thin films, sliding wear-corrosion, fretting corrosion, micro-abrasion-corrosion, erosion-corrosion, tribo-corrosion models, bio-tribo-corrosion, surface engineering and materials, nano-corrosion, surface modifications (nanotube and texturing) for improved tribo-corrosion resistance, and to promote bio-

compatibility and cell viability. We are delighted that the journal will be publishing the Proceedings of the 4th Tribo-corrosion Conference 2014.

For prospective authors, the submission process is now open.



Journal of Bio- and Tribo-Corrosion
Front Cover



Editors-in-Chief

M.M. Stack



M.T. Mathew



Y. Tian