



## The South African Institute of Tribology

Since 1985

*'Understanding Friction, Lubrication and Wear'*

SAIT's Office Hours: 09:00 – 15:00, Mondays to Thursdays; Fridays we work from home.

Telephone No. 011 804 3710: If no answer, please email [secretary@sait.org.za](mailto:secretary@sait.org.za)

# SAIT Technical Newsletter, October 2021

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## Tribology

**Tribology** is a term that overcomes the 'silo effect' in research and information. Rather than separating them, Tribology defines and embraces Lubrication, Friction, and Wear as one system, and not those factors in isolation of each other.

For example – lubrication, on its own, may not be a solution to extreme wear. An integrated, tribological viewpoint can change a root cause analysis profile. TRIBONET points out – 'Tribology has been used in various fields to improve reliability and longevity of systems.'

As we now struggle with '**Code Red for Mankind**' here comes the environment in which tribology will play a decisive role in the long-term future. '**Environmentally Acceptable Lubricants**' (EALs) are massive subjects that deserve strategic attention and a possible change of lubrication policy – or at least to be written into a lube policy document (if such a document even exists).

To consider a lubricant as environmentally acceptable, it requires to pass regulations in the following properties:

- Biodegradability
- Renewability
- Toxicity
- Bioaccumulability and
- Biomagnification.



*"The world has enough for everyone's need,  
but not enough for everyone's greed."*

*Mahatma Gandhi*

Need and greed drive the markets. There will not be a voluntary shift towards EALs; government regulations and legally enforceable standards are the only way that EALs will be adopted. Legally enforceable standards are not even feasible in the current South African lubricant market. The EALs market creates a perfectly contrived lubrication sector for snake oil to survive. So, we can just watch world markets with interest ...!

Please visit <https://www.tribonet.org/wiki/environmentally-acceptable-lubricants/>



*The Silo Effect - non-communication  
between departments*

## TAN – Do Not Overlook It!

'Tan' is an important quality measurement of crude oil. The **total acid number (TAN)** is a measurement of acidity that is determined by the amount of potassium hydroxide in milligrams that is needed to neutralize the acids in one gram of oil.

The TAN value indicates to the crude oil refinery the potential of corrosion problems. It is usually the naphthenic acids in the crude oil that cause corrosion problems. This type of corrosion is referred to as naphthenic acid corrosion (NAC).

TAN values may also be useful in other industries where oils are used as lubricants to determine oxidation and the subsequent corrosion risk to machinery.

Please visit: [https://en.wikipedia.org/wiki/Total\\_acid\\_number](https://en.wikipedia.org/wiki/Total_acid_number)

### Total Acid Number

#### Definition

The mass of potassium hydroxide (KOH) in milligrams that is required to neutralize the acids in one gram of oil.

#### Formula

$$AN = (V_{eq} - b_{eq})N \frac{56.1}{W_{oil}}$$

$V_{eq}$ : Titrant consumed by sample+spiking solution  
 $b_{eq}$ : Titrant consumed by spiking solution  
 $N$ : Molarity of titrant

## SAIT Training 2021/22

### Introductory Courses on Lubrication Engineering and Wear and Materials

If you are interested in attending one of our **1-day Introductory Courses**, see <https://www.sait.org.za/events/training/> or email us at [secretary@sait.org.za](mailto:secretary@sait.org.za) or [admin@sait.org.za](mailto:admin@sait.org.za).

A certificate of attendance will be awarded to delegates who complete each course. Delegates will also earn 0.8 CPD Credits, as these courses are registered with ECSA.

More information on all SAIT Training Courses can be found at: <https://www.sait.org.za/events/training/>

### Lubrication Engineering Courses:

LE 133:	18-22 Oct 2021	Live – current	Johannesburg
LE 134:	21-25 Feb 2022	Live – please book before November 30, 2021, or in January 2022.	Johannesburg.



Please contact either the SAIT Secretary at [secretary@sait.org.za](mailto:secretary@sait.org.za) or the SAIT Administrator and Bookkeeper at [admin@sait.org.za](mailto:admin@sait.org.za) for forms or further information. Thank you.



The 2022/23 Courses will be announced soon at <https://www.sait.org.za/events/training/> and in the next Training Newsletter.



## **SAIT Membership**

If you are not already a SAIT Member, please consider joining us, to help save your machinery running costs, and to benefit the planet. It has recently been said that Tribology is The Science of the Future!

There are several categories of membership, with varying benefits for you, the Members. To find out more about SAIT Memberships, please go to <https://www.sait.org.za/membership/benefits/>, or email Isabel at [secretary@sait.org.za](mailto:secretary@sait.org.za) or Berice at [admin@sait.org.za](mailto:admin@sait.org.za).

Membership runs from March to February, with a discounted rate from July to December, or two months free when joining the following year in January or February.

Join us now, to learn more about the all-essential triumvirate of **Friction, Lubrication and Wear!**

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## **SAYTA, Under the Auspices of SAIT**

To promote Tribology among younger people in tribology related industries, the South African Young Tribologist Association (SAYTA) was recently formed.

The aim of this group is to function as a support network between young individuals working in tribology and related industry, also linking young members to experts in the industry. This will ensure continuity in the transfer of knowledge and experience.

The group will also focus on addressing current issues experienced in industry.

SAYTA will be formalized in the next few months and then become more active.

***Young SAIT members qualify, at no extra cost, to become a member of SAYTA.***

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## **International Events**



For a full list of upcoming international events please visit [Tribonet Conferences](#), where links take you to each event in full detail.

Every Wednesday, a new recorded webinar is available, free, to all STLE Members. We also provide links to TLT articles related to the webinar topic. For more information, please go to:



Society of Tribologists and Lubrication Engineers

[https://www.stle.org/WebinarWednesdays?utm\\_source=Real%20Magnet&utm\\_medium=email&utm\\_campaign=156033357](https://www.stle.org/WebinarWednesdays?utm_source=Real%20Magnet&utm_medium=email&utm_campaign=156033357)

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## **ADDITIONAL CALL FOR ABSTRACTS**

We are pleased to announce the **opening of an additional abstract submission for WTC 2022**. This will provide an opportunity for tribologists who have not done so to submit their research for oral or poster presentation.

There is no need for authors who have confirmed an oral or poster presentation at WTC 2022 to submit a new abstract to present an updated version of their work. Abstracts already accepted for WTC 2021 and confirmed for WTC 2022 are still considered for the final program.

We are therefore looking forward to the submission of new contributions. We remind that the conference will be organized around ten scientific themes and a partner event.

**Any new contribution will be welcome from October 15 to November 15, 2021**, on the submission platform and will be reviewed by the Scientific Committee. Acceptance will be notified by e-mail by end of 2021 at the latest. Selected papers will have the opportunity to be published in the peer-review journals partners of the conference, which are referenced on the conference website.

We look forward to welcoming you at WTC 2022.

With Best Regards,  
Philippe VERGNE & Philippe KAPSA  
General Chairs

### **ABSTRACT & REGISTRATION**

#### **Abstract submission**

Opening: **October 15, 2021**

Closing: **November 15, 2021**

#### **Early-bird registration,**

**Deadline:**

**February 15, 2022**

### **WEBSITE & CONTACT**

[www.wtc-2022.org](http://www.wtc-2022.org)

Information at: [registration@wtc-2022.org](mailto:registration@wtc-2022.org)

## Contamination Corner

### Breathers – overlooked & under-rated



*Diff Breathers are as important as any other Breather in the Driveline*

Every major driveline unit must breathe. From an engine crankcase to a differential housing, every main component in a vehicle driveline creates operating pressure that needs venting through a breather. If there is nowhere for this pressure to go, oil gets forced past seals with visible leaks and lubricant losses. That's why – no matter whether engine, gearbox, or diff – *lube overfilling causes very detrimental excess pressure*. And then there's the environmental impact. Overfilling and leaks only serve to compound vehicle pollution well beyond exhaust emissions.

Driveline components behind an engine don't have to deal with bypass gases but must still be allowed to ventilate. Breathers are necessary to relieve pressure in gearbox and axle housings caused by temperature changes.

Without a breather, or if the breather is clogged (whoever checks this?), pressure that builds up inside an axle housing will push gear oil past the pinion or axle seals. And now for the kicker – *the location and type of breather on a drive axle can play a vital role in component life or failure*.

References for this drawn from:

**Robert Bosch GmbH – Diesel Engine Management plus the Automotive Handbook**



Here's a fascinating branch of tribology terminology – what is

**Triboluminescence (TL)?**

Triboluminescence is a **tribology** phenomenon resulting in the generation of light through creating any **frictional interaction** between the materials. The term for this phenomenon comes from a combination of the Greek word for "rub", *tribein*, and the Latin word for "light", *lumin*. Frictional motion refers to the process of rubbing, scratching, crushing or ripping a material; The process leads to contact electrification by separating and reunifying the electric charges. Although this optical phenomenon is widely researched, still there is a long way to go to fully understand it.

In general, the triboluminescence effect can be used to design smart structural sensors. These sensors can be used for damage detection and monitoring of civil, aerospace, military structures,

## Did You Know?

### Triboluminescence



spacecraft structures, and aircraft. TL-based sensor systems have the potential for wireless, in situ, and distributed sensing that can enable real-time continuous monitoring and makes them attractive for several industrial applications. They can also be used as stress, fracture, and damage sensors.

Please visit: <https://www.tribonet.org/wiki/triboluminescence/>

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## From the President's Desk

### Patrick G Swan



#### Oil Quality or Lubricant Quality?

To too many people oil is oil – if it looks good, its useable – in any application.

Tribologists use lubricants, and lubricants are developed and formulated for specific applications. Lubricants are also packaged, which gives the marketer space to display both marketing information, and more critically for the tribologist, technical information and specifications. And here's the problem. Because marketers often believe that the end user sees oil as oil, they use the space on packaging primarily for marketing. Essential information is regularly relegated to the fine print, usually on the back of the container.

Marketers could do themselves, and their customers, a huge service by using the space on packaging to educate their customers. Users can then learn the intricacies of using the appropriate or best lubricant for each application. And because the best lubricant gives the best results, the marketer will enjoy repeated sales.

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## Parting Shot!

What is quality? Is it the price or the packaging? Or is it the standard of something as is measured against other things of a similar kind; the degree of excellence of something?

**When it comes to lubricants (and wear components), quality is critical in terms of reducing the total cost of ownership.**

**If the quality is measured against a standard, then when selecting a product, the actual performance of the lubricants (wear material) should be compared with one another not only the additive, but the complete product.**



*John Fitton*  
**SAIT Member**

## **We Want to Hear from YOU**

1. Please let us know what topics are of interest to you.
2. Please submit interesting paragraphs or articles that we can share with the SAIT community, by sending them to [secretary@sait.org.za](mailto:secretary@sait.org.za) for forwarding to The Editor. This will assist in disseminating information to all involved in Tribology.
3. Please let us know what would interest you for technical sessions or webinars
4. Please let us know of interesting presenters from whom you would like to hear.



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## **The SAIT Mission:**

**"To promote technology transfer, whereby local tribological problems can be solved and products improved."**

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