



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.

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SAIT Technical Newsletter, September 2021

Tribology

Tribology has a massive role to play in countering 'Code Red for Mankind'.

'Code Red' is the description we now find ourselves in regarding climate change. The recent disastrous hurricanes, floods, fires, and droughts have moved the focus from global warming (the cause) into climate change (the result).



Here is a 5-year-old benchmark: 'The global vehicle population stood at 1.32 billion cars and trucks at the end of 2016, more than double the volume 20 years prior when vehicles-in-operation total was 670 million in 1996. Coincidentally, the fleet grew at about the same pace in the 20 years through 1996 by roughly doubling 1976's 342 million.' **If that staggering rate of growth continues, the total doubling**

every 20 years, then we can expect to see some 2.8 billion vehicles on the planet in 2036.

- <https://wardsintelligence.informa.com/WI058630/World-Vehicle-Population-Rose-46-in-2016>
- <https://www.carsguide.com.au/car-advice/how-many-cars-are-there-in-the-world-70629>

The friction emanating from billions of vehicles cannot be overlooked. More importantly, it is not just internal combustion (IC) engines that are creating an environmental dystopia, but also the driveline behind the engine. Directly behind an IC engine are high-friction components to multiply torque into the driveline - a clutch or torque convertor. Worse still can be the presence of asbestos in clutch-plate facings. Many automotive manufacturers used asbestos for its affordability and heat-resistant properties. The material still exists in some asbestos auto body parts, such as aftermarket brake linings, clutches, and heat seals. Working with vehicle replacement parts that contain asbestos can pose a significant risk to auto mechanics, DIY home mechanics, hobbyists and others who work with cars. A single nanogram of brake dust can contain around 90,000 asbestos fibres — a significant hazard even where exposure is limited. We are not only warming the planet we are poisoning it as well. <https://www.asbestos.com/occupations/auto-mechanics/>

'Code Red for Mankind' requires an integrated view.



Let's not just focus on vehicles and the move from IC engines into electric drivelines. Our love for beef products and a juicy steak on the table is also driving global warming.

How many cattle are in the world? The global cattle population amounted to **about one billion head**

in 2020, up from approximately 989 million in 2020. The domestication of cattle began as early as 10,000 to 5,000 years ago.

From ancient times up to the present, cattle are bred to provide meat and dairy. Please visit: <https://www.statista.com> › Agriculture › Farming

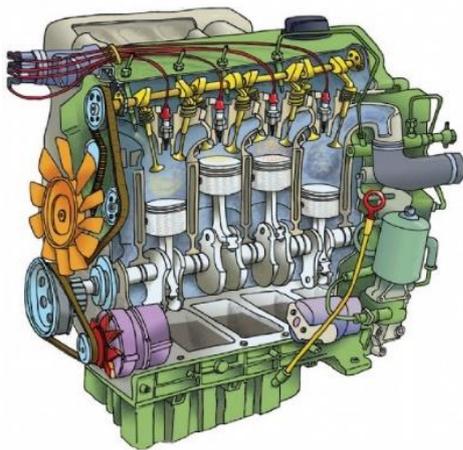
Cattle emit methane – CH₄. Releasing 1 kg of CH₄ into the atmosphere is about equivalent to releasing 84 kg of CO₂. Methane's **100-year**

GWP (Global Warming Potential) is about 28x CO₂ – but it only persists in the atmosphere for a little more than a decade. The 100-year GWP is used to derive CO₂e. Please visit:

<https://climatechangeconnection.org/emissions/co2-equivalents/>



New Regulations for Hydrocarbons



Government Gazette No. 45068 dated 31 August 2021 repeals the Regulations regarding petroleum products and specifications and standards published under Government Notice R627 of June 2006 to be replaced with new Regulations that shall come into effect on **01 September 2023**.

This 12-page Gazette contains three pages of definitions with low-sulphur diesel pegged at 10ppm and biodiesel blended at not more than 5%. 'Petroleum products' means for the purpose of these Regulations, petrol, diesel and biofuel – lubricants are not mentioned here.

This does effect product planning and in a wider context the role of tribology in an internal combustion engine.



SAIT Training

Introductory Courses on Lubrication Engineering and Wear and Materials

If you are interested in attending one of our **1-day Introductory Courses**, email us at secretary@sait.org.za or 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.

Lubrication Engineering Courses:

LE 133:	18-22 Oct 2021	Live	Johannesburg
LE 134:	21-25 Feb 2022	Live	Johannesburg.



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



SAIT Events

SAYTA, Under the Auspices of SAIT

To promote Tribology among younger people in tribology related industry, 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.

**Summary of the Evening Technical Webinar, Held via Zoom
At 18:00 on Wednesday 8th September 2021**

'How to Improve Filter Life Whilst Not Compromising Oil Cleanliness – a Solution to Metal Contamination.

Presented by Colin Nieuwoudt of Afrimat.



Colin Nieuwoudt of Afrimat was the 2021 Winner of the SAIT's Best Technical Achievement Award. He was 'presented' with a view of the Shield for this award at the start of the meeting when he and Afrimat were congratulated by the SAIT Secretary on behalf of the SAIT. He will receive it in Cape Town in due course.



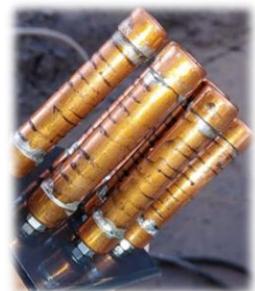
Magnetic Particles Collected within the first week.

Oil contamination on a crusher can be divided into two categories: wear metals and contaminants. Afrimat's kidney systems, which are installed on its crushers, are designed to remove both types of contaminants by filtering up to 7-micron, Beta 2000.

Good Crusher after One Month

However, because of the fine filtering media, the filters had to be changed almost every month. Colin devised a strategy to extend filter life while maintaining oil cleanliness.

He decided to use magnets to remove the metal particles from the crusher's return oil. The goal was to remove as many metal particles as possible from the oil because the more contaminants removed from the oil, the longer the crusher, oil, filters, and pumps will last.





A set of ten magnet tubes only costs R2806.00, which is reasonable given the potential savings on filters, oil and crusher components.

The magnets can withstand temperatures of up to 150°C and are easily cleaned with a rag, making *Magnets Installed in The Oil Return from The Crusher* them reusable and eliminating the need for frequent replacement.

This initiative managed to extend filter life from 1 month to 9 months, equating to an estimated saving of R117 083.61 per crusher.

Each Copper Tube is 75mm long and holds 6 magnets, 8 – 10 mm long and about 12,5 mm in diameter; between each magnet there are metal

washers/shims of 4mm.

"The trick in the whole exercise is the way you put the magnets together. One must keep the socket very still and the right way up, with a metal seal from the valve," Colin replied to one of the questions asked.

He also stated, "New oil is not clean oil; so the cleaner you can get the oil, the lower the wear.

"The magnets are natural, not electronic. Once the magnets are properly installed, they can be cleaned regularly and used for a long time – there should be no need to replace the magnets at all. The magnet tubes are spaced widely enough to enable easy cleaning with a rag."

The pictures are of his prototype.

International Events

For a full list of upcoming international events please visit

[Tribonet Conferences](#), where links take you to each event detail.

tribonet in full



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:

https://www.stle.org/WebinarWednesdays?utm_source=Real%20Magnet&utm_medium=email&utm_campaign=156033357

Contamination Corner

One consequence of global warming is flooding (just witness Hurricane IDA) – with that comes moisture contamination and here comes summer rainfall. H₂O contamination never goes away – it is a constant battle.

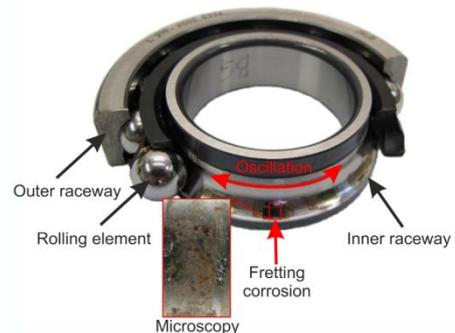
Moisture in lubricating oils can have a devastating impact on component lifecycles – Noria.com

'According to a major bearing supplier, it is possible to shorten the life of rolling element bearings by as much as 75 percent without ever knowing that moisture is in the oil based on visual observation.

'Water causes oxidation, acid formation, varnishing, sludging, foaming, viscosity problems (water first thickens and then thins the oil) and can cause an oil to become conductive. Water also creates conditions for corrosion to dramatically increase.

'Water can be driven off oil by maintaining the right temperature and using absorbent media filters and vacuum dehydration.

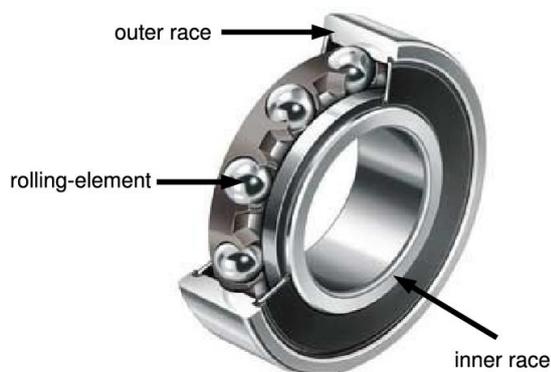
'Industrial equipment that is frequently turned on and off is most susceptible to moisture from the atmosphere, particularly during the summer months when atmospheric moisture is at its peak.'



Did You Know ? Fretting

Here's an item seldom encountered in everyday terminology– fretting. What is it?

Fretting or fretting wear is a specific **wear** type which is characterized by low amplitude oscillating sliding between bodies, which are nominally at rest [1] (for example due to vibration, cyclic stresses,



etc). The amplitude of sliding may vary from tens of microns (in bolted joints, electrical contacts) to tens of nanometers (in **MEMS**). Fretting typically appears as pits or grooves surrounded by corrosion products. Fretting is usually accompanied by corrosion (in a corrosive environment).

In fretting there is no macroscopic sliding. Fretting is a

combination of **abrasive** and **adhesive** wear, where under applied normal load adhesive junctions occur, while the oscillating motion causes rupture of the material in a form of **debris**.

An excellent article in TRIBONET covers fretting in easy-to-read detail under the following headings and supporting references

- Fretting corrosion
- Fretting test
- Fretting corrosion mechanism – three stages
- Fretting fatigue - life is shorter than plain fatigue life.
- Factors affecting fretting – contact load, amplitude, number of cycles, temperature, relative humidity, inertness of materials

Fretting is a process integral to the science of tribology. **Visit:** <https://www.tribonet.org/wiki/fretting-corrosion/>

Parting Shot!

The average cyclist exerts 250 to 300 watts of energy. A badly maintained chain can absorb 20 to 30 watts or approximately 10% of the energy at 90 rpm - the question is why not maintain the chain by cleaning and lubricating with a dedicated lubricant formulated for the application, that protects the moving parts and reduces friction. This will ensure more energy is transferred to the wheels and save those legs.



This is equally applicable to industrial applications.

Announcing the 2021/22 SAIT Executive Committee



A warm welcome to new, co-opted Member of the SAIT Executive Committee, Henco Booysen of Oily SA.

Oily SA is a Corporate Member of the SAIT.

Patrick Swan, SAIT President

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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 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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