UVPERSU NEWS

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Your union

UVPERSU is a registered, independent, non-racial, diverse union, that unites its members - not to be militant - but to protect and improve the interests of its members in the workplace in a constructive manner and by way of negotiations to the benefit of those concerned.

We listen to truly hear, we care through action and so we add value to the working environment. We achieve together!

Re mamedisisa hore re utlwe kannete, re tsotella ka diketso, mme ka mokgwa o jwalo re eketsa bohlokwa tikolohong ya tshebetso. Re fihlella mmoho!

Vision

UVPERSU's vision: To be the most influential and leading union in higher education.

Mission

UVPERSU's mission: As a professional and non-political union, UVPERSU strives to serve the interests of members, collectively and within the framework of existing labour legislation and promote positive attitudes towards the preservation and growth of the University as an institution.

Values

UVPERSU's values: Accountability, respect, integrity, equity, equality, devotion.

Engineering Sciences at the UFS

The University of the Free State initiated a project in Engineering Sciences (EnSci) in 2013 and it has the following phases:

Phase 1

Establishment of a 3-year BSc programme majoring in Physics and Engineering subjects as precursor to a full 4-year engineering programme

3 years, 2014 – 2016

Phase 2

Establishment of research focus areas, initiatives, and third-stream income

3 years, 2017 – 2019

Phase 3

Expanding the programme to include a 4-year BEng (Agricultural and Biosystems Engineering)

3 years, 2021 – 2023

Phases 1 and 2 have been completed successfully. Phase 3 is well-advanced with approval already obtained from the Engineering Council of SA (ECSA) as well as from the DHET, and the full BEng programme has been officially added to the UFS Programme Qualification Mix (PQM). The final step, to take place in 2024, will be approval from the South African Qualifications Authority (SAQA).

This article provides an overview of some of the interesting things that have taken place at Engineering Sciences over the last nine years.

Engineering Sciences has graduated 61 students since its inception in 2013. Most graduates have gone on to five other universities to continue with a further two years of study in 7 different engineering disciplines, namely civil-, electrical-, electronic-, mechanical-, mechatronic-, aeronautical- and industrial engineering. The UFS graduates leave the institution having had greater exposure to physics and mathematics modules than their peer-level full engineering students and this deeper academic rigour has ensured their successful articulation and completion of engineering degrees at other Universities.

Engineering Science has worked with Institutional Advancement and was able to secure third-stream income and UFS research projects with an accumulated R34.1 million to EnSci. The existence of EnSci as an engineering programme has also unlocked funding for several other UFS departments.

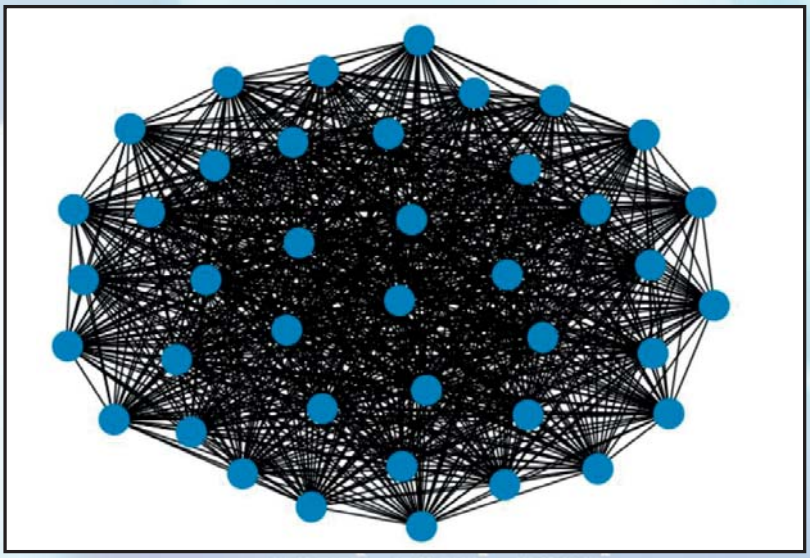
EnSci develops a formal strategic plan at the beginning of each year and has adopted some unique terminology where lecturers are referred to as facilitators of learning and the HoD is referred to as the Chief Inspiration Officer (CIO). EnSci also refers to staff meetings as "connect" meetings and has embedded a progressive meeting preparation and meeting pre-minutes strategy to substantially reduce meeting times. Facilitators regularly engage in supporting each other in Education Concepts (EduCon) gatherings.

Focusing on the unique abilities of the staff attracted to the Department, EnSci is using a broad central theme of energy optimisation and waste reduction which articulates into four research groupings, namely energy efficiency, grid-related research, the circular economy and green concrete.

Dr Jacques Maritz

Some projects, such as those of the Grid-Related Research Group (GRRG) at EnSci have had a profound effect on the UFS, most notably the fact that the UFS has been exempted from load shedding since May 2023! This interdisciplinary research group consists of astrophysicists, physicists, electrical engineers, mechanical engineers, medical scientists, computer scientists, master's degree students and junior student researchers. The members of this group make meaningful contributions in the following areas:

Power system dynamics



Power systems are very complex and specialised tools are needed for analysis when investigating stability, synchronicity and overall grid resilience.

Carbon analysis, carbon reduction, carbon management strategies

The GRRG is committed to aiding in the overall reduction of carbon emissions via energy optimisation. In particular, we focus on Strategic Development Goals 7, 12 and 13.

Smart grids, microgrids, data monitoring, data acquisition, data analysis and data storage

Specialised data acquisition infrastructure is needed to accurately track and stabilise campus microgrids under the most variable conditions. The GRRG designs and creates unique in-house solutions to overcome these barriers.

Construction of social stochastic models that describe human behaviour within energy ecosystems

Construction of stochastic models that describe the noise observed in power systems

The GRRG has been instrumental in Facilities Management having been able to establish the UFS smart grid and QwaQwa microgrid with the view to ensuring energy security for the UFS. Current research endeavours are aimed at understanding and predicting the stability of the national power grid by combining physics, mathematics, computer science and engineering.

In general, humankind has created a mostly linear economy where a raw material is extracted, used and then eventually discarded as waste. In contrast, in a circular economy approach the "waste" becomes an input instead of a raw, sometimes scarce and expensive material, and is re-used multiple times. EnSci started its Circular Economy research project in the latter half of 2023 and it is aimed at developing a new spirally oriented, multi-level circularity concept spanning horizontally to touch and influence all the other research projects. The need for this project is heavily influenced by the National Skills Development Plan which includes aspects relating to just job creation and new future occupations, transformation of the skills ecosystem and an increased responsiveness, ensuring energy security and the green economy. The project will increase public awareness of the circular economy through an awareness campaign by means of webinars. It will also provide Circular Economy training to engineers, manufacturers and small-scale and medium-scale enterprises, including case studies. Additional technical research on green manufacturing opportunities within the manufacturing, engineering and related industries will also be conducted. Figure 1 indicates the possibilities of an industrial system economy to be circular through the well-known McKinsey "butterfly diagram". Watch this space...

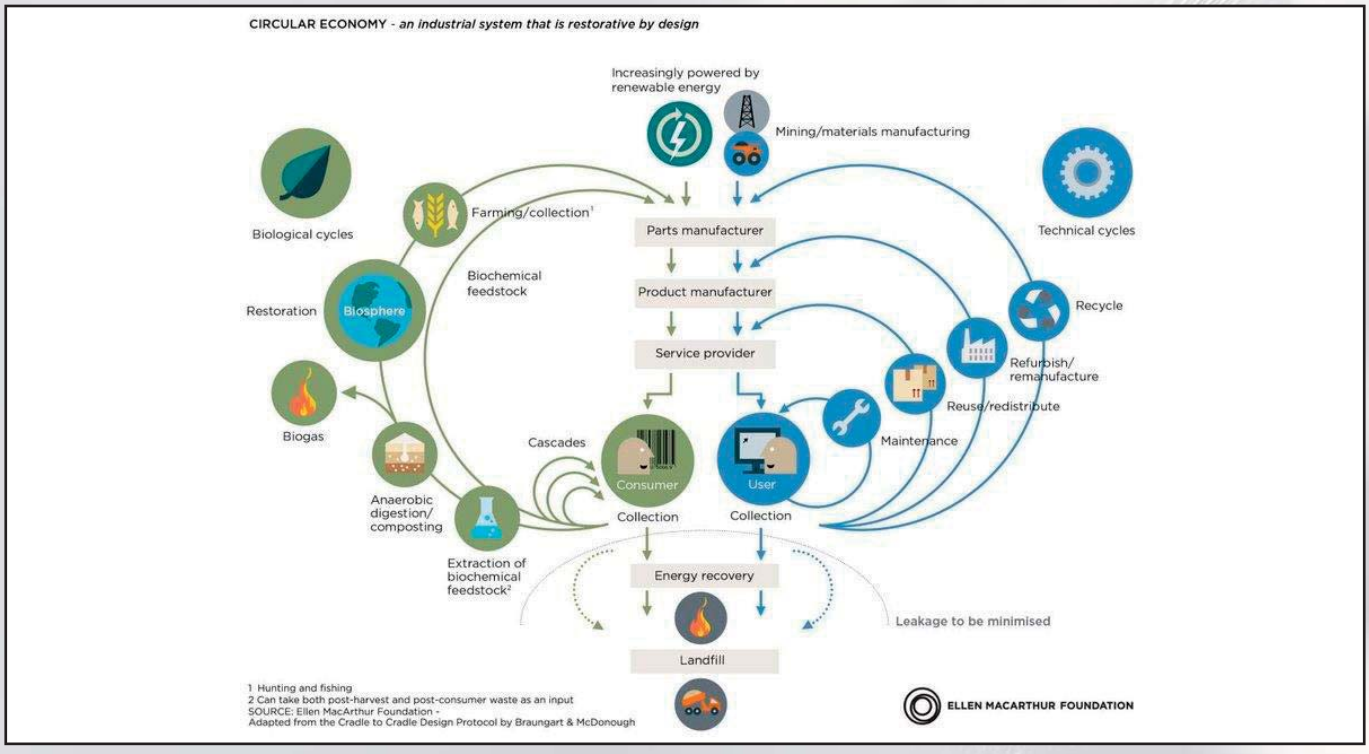


Figure 1: McKinsey circular economy butterfly diagram (Ref: McKinsey foundation)

Dr Abdolhossein Naghizadeh

Mr Damund de Klerk

The manufacture of Ordinary Portland Cement (OPC) is one of the largest manufacturing processes in the world, using a very energy-intensive process requiring a temperature of up to 1500 degrees Celsius while simultaneously emitting large quantities of environmentally undesirable compounds. Making concrete using cement is a linear process using raw material resulting in large quantities of un-useable waste rubble.

Now, re-imagine a process that uses some of the 20 to 23 million tonnes of fly ash waste from Eskom power stations as input to manufacture concrete of which the rubble can also be re-used again as cement! This is what has been under continual development in the UFS EnSci Green Concrete Lab, an innovative hub dedicated to research projects on green concrete. With a focus on eco-friendly cement, circular economies, and pioneering concrete technologies, the lab hosts a series of ongoing projects aimed at redefining the landscape of construction materials and developing new future construction materials. Several cutting-edge research projects have included the following:

Recyclable cement

Every year, billions of tonnes of demolished concrete is found in landfills globally, with a remarkable amount of raw materials used to produce new concrete materials. One of the flagship projects at the Green Concrete Lab is the development of an eco-friendly cement that can be recycled and reused when a building is demolished.

Using agricultural waste material in 3D printable concrete

The EnSci Green Concrete Lab is collaborating with the University of Johannesburg to explore the utilisation of agricultural waste material as input for 3D printable concrete. Leveraging sustainable sources such as agricultural by-products, the project seeks to create a concrete mix that is not only eco-friendly but also adaptable for advanced construction techniques such as 3D printing, paving the way for more efficient and sustainable building practices.

Using industrial waste in 2-part Geopolymer cement

The production of Portland cement is responsible for 6-8% of overall carbon emissions worldwide. Alternative binders are one of the solutions for controlling the significant environmental impacts caused by cement production. The development of an eco-friendly cement based on geopolymer technology aims to capitalise on the use of industrial by-products, transforming them into a robust and environmentally conscious cement alternative. The study not only addresses the issue of waste management but also offers a promising solution for producing high-performance construction materials with minimal environmental impact.

Efflorescence of Geopolymer Concretes

Another pivotal project delves into understanding and mitigating the phenomenon of efflorescence (undesirable chemical reaction between alkalis in geopolymer and atmospheric carbon dioxide causing deterioration) in geopolymer concretes. By delving deep into the chemical interactions and environmental factors contributing to efflorescence, researchers are aiming to develop strategies to prevent or minimise this occurrence, which is essential for ensuring the long-term durability of geopolymer-based constructions.

The collective efforts of these research projects at the UFS EnSci Green Concrete Lab signify a paradigm shift in the construction industry. As these projects progress, their impact promises to redefine the very foundation of construction materials, paving the way for a more sustainable and resilient built environment.

Figure 2 *UFS EnSci Green Concrete Lab*

Figure 3 *Researchers from UFS EnSci Green Concrete Lab are collaborating with University of Johannesburg on the formulation of 3D printable concrete mixtures based on agricultural waste*

EnSci has presented a webinar to the SA Institute of Civil Engineers (SAICE) and is far advanced in the process of developing a Short Learning Programme to train the civil engineering fraternity on using green concrete.

Mr Louis Lagrange

Energy – a commodity we know exists as we can see/feel/experience its effects. It is also a hotly debated topic in South Africa, where a widely diverse range of opinions is presented, not all in line with the scientific facts of energy dynamics and what is possible. Energy is part of and permeates all aspects of our lives and is the heart of sustaining our lives. Think about this: is there anything that happens without energy and energy transformation? The conversion of energy costs money, but how much and at what efficiency? How do we measure this, what are the metrics? Interestingly enough, there are only two main metrics for energy efficiency: the rate of energy use in kilowatt (which can be reduced by new technology) and the time of energy use in hours (which can be controlled by either humans or control systems).

Energy cannot be created or destroyed, thus there can actually be no energy conservation, a phrase that is commonly used. The correct approach is to refer to useful energy, and through conversion of the energy to a more useful form, we want to know how much is paid for what we receive in useful energy. Figure 4 depicts the concept of "exergy", which is the practically useful energy available. The question then changes to: "how much of the practically available exergy did my process convert to actual useful energy?" This is the start of a new way to consider energy we approach it from the angle of how much exergy the process was able to extract/deplete. The latest approach to energy efficiency is how much of the exergy was depleted (transformed into useful energy).

The EnSci research group considers both the active as well as passive ways to enhance energy efficiency and is actively expanding the designated capacity of staff by sending staff to complete international energy efficiency courses such as the Certified Energy Manager (CEM), Certified Energy Auditor (CEA), Certified Measurement and Verification Professional (CMVP) and Certified Lighting Energy Professional (CLEP) trainings.

The approach of the EnSci energy research group stems from the belief that we are wasting a large portion of the electrical energy we generate (pay for) and that we should focus on lowering the end-use of electrical energy so as to reduce the strain on generating it. In order to do this, we need to measure the flow of energy conversion from, in the case of SA, energy

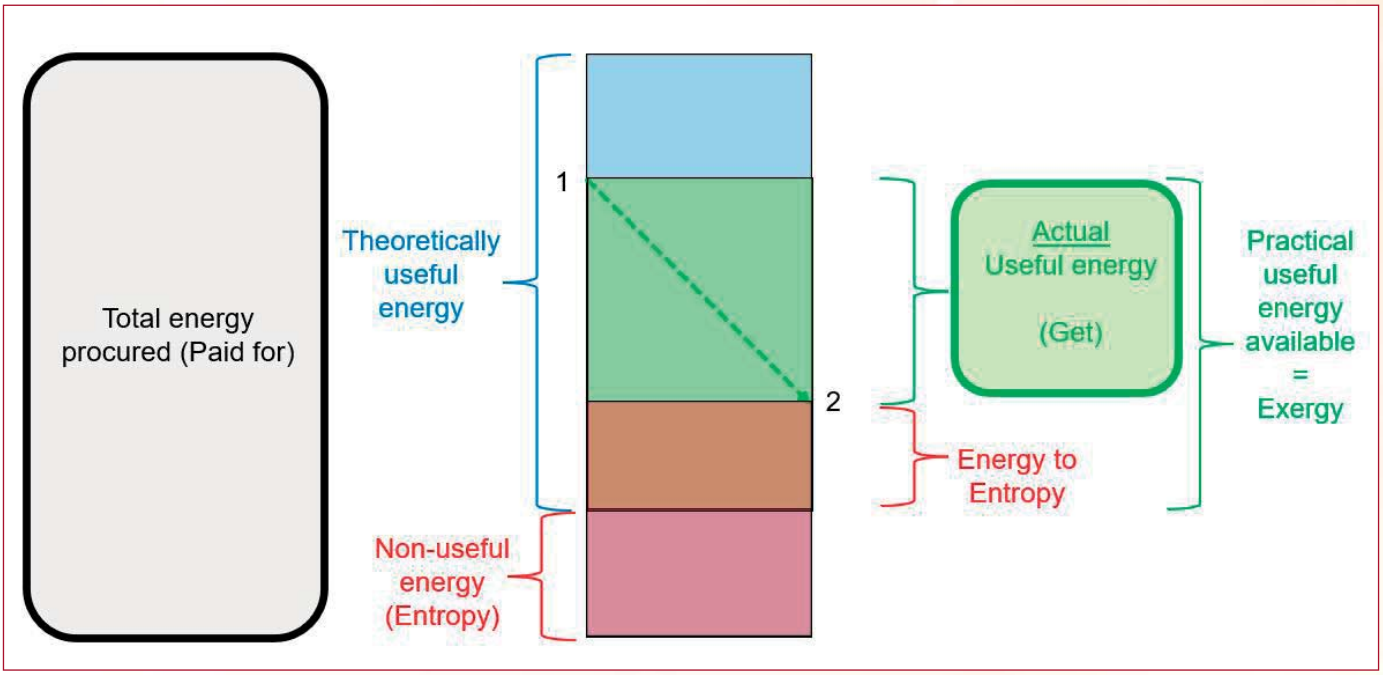


Figure 4: Total energy procured (paid for) versus actual useful energy (ref: LF Lagrange)

embedded in the coal, to the final Point of Use (PoU). EnSci has developed a new Green Building Index (GBI) for South Africa where the electrical fingerprint of a building provides a quick and acceptable indication of energy efficiency. Along with this the SA government has promulgated a new law that certain building categories and sizes must reveal their energy use per square metre per year in the form of an Energy Performance Certificate (EPC) which is then benchmarked and compared against other similar buildings. EnSci is active in the development of the EPC training material for the SA National Energy Development Institute (SANEDI).

Another energy related project developed a Green Manufacturing Index (GMI) for South Africa to focus on energy efficiency. EnSci is testing and modelling different energy efficiency materials for the lowering of energy use in a passive way and have applied the material to the roofs, walls and ceilings of classrooms at different schools in Bloemfontein. The results are now being considered. Plans for new innovative, passive ways to heat houses in winter and their economic feasibility are also underway.

EnSci has furthermore conducted webinars on the use of renewable energy for eco-industrial parks for the CSIR National Cleaner Production Centre (NCPC). The CSIR's NCPC has thus made some of the energy training material available to the UFS for use in undergraduate training, including their expert-level energy training and UNIDO specialist training courses.

Dr Sogo Abolarin

A component of passive energy reduction lies in incorporating insulative material into bricks, thus lowering heat transfer between the inside and the outside of a dwelling. The necessary research equipment for this has been developed and first tests have been conducted. The incorporation of waste material and the circular economy is next in the list of research plans.

Figure 5: Testing the thermal properties of bricks incorporating waste material as insulation

Some of the collaborative research with other universities includes the following areas: (1) heat transfer, pressure drop and entropy generation, (2) energy efficiency and conservation, (3) renewable energy.

Heat transfer and pressure drop and entropy generation

The need to minimise energy loss and also to recover waste heat considers quantifying and analysing thermal and friction entropy generation rates in tubes with passive enhancement techniques such as twisted tape inserts and inwardly corrugated tubes with different configurations and more importantly in the three flow regimes, namely laminar, transitional and turbulent. These studies enable the determination and quantification of the real heat transfer coefficient, pressure drop and entropy generation as well as performance enhancement in each flow regime with different heat fluxes, twist ratios, ring space ratios and, in comparison, with smooth tubes. This knowledge is now being used to determine the thermal properties (thermal conductivity, thermal resistance, specific heat capacity, thermal capacity and time constant) of building materials.

Energy efficiency

This research aims to continue the investigation of international best practices that help to reduce energy consumption without compromising comfort. This will lead to improving and increasing energy prosperity and efficiency to achieve a low carbon economy. This will assist energy users to be more energy conscious, save money and the environment by adopting energy efficiency and conservation best practices to increase the energy performance of facilities and processes in accordance with ISO 50001 (Energy Management Systems).

Renewable energy decision support tool

Renewable energy solutions are always preceded by considering all possibilities forms of energy efficiency in order to lower the total amount of energy required, before renewable energy solutions are considered. This research involves developing a clean energy management and information tool to assist energy users with their transition to clean energy technologies starting with Solar Photovoltaic systems. This Decision Support System (DSS) is termed the Clean Energy Management and Resource Information Tool (CEMRIT). CEMRIT aims to assist the South African youth in developing skills in energy efficiency through the current SANEDI-driven Energy Performance Certificate (EPC) practitioner training. It will expand and enhance the ability of the youth being trained in energy assessment to add this as an additional tool to guide their decision-making processes, supported by the appropriate fundamental scientific thinking processes.

Mr Sandile Dladla

Water-Energy-Food nexus

Water uses energy, energy uses water and agriculture depends on both. Humankind and our increasingly urban societies need all three but these resources continue to be depleted. The Water-Energy-Food (WEF) nexus is a multicentric lens for assessing integrated resources management and sustainable development in agriculture.

Mr Dladla is busy with his PhD titled "Investigation and improvement of peak discharge estimation in design flood estimation models". Estimates of design floods are required for the design of hydraulic structures (e.g. dam spillways, waterways, culverts) and to quantify the risk of failure of these structures. Most of the methods used in design flood estimation in South Africa were developed in the late 1960s and early 1970s and are in need of being updated with more than 40 years of national data currently available and with new approaches being used internationally. The South African National Committee of Large Dams (SANCOLD) has identified the urgent need to update the data and methods used for design flood estimation in South Africa. A wide range of issues have been highlighted for research focusing on rainfall, flood analysis methods, data, and products to develop reliable and consistent methods of flood estimation. This research aims to address the limitations and inconsistencies linked to peak discharge estimation in South Africa.

Lastly, EnSci is currently expanding their offices to incorporate the BEng (Agricultural and Biosystems Engineering) programme lecturers, with new laboratories planned for 2024 and an entire new building for the BEng programme in the near future.

Meet Ilse de Beer and Bärin Björk and the rest of the family!

By Anita Lombard

Ilse de Beer surely is one of the most interesting, talented, and unique persons I have ever met! We have been friends and colleagues for a long time and through the years I got to know her very well and she still never stops to amaze me!

She is a keen photographer and YouTuber and makes videos of pictures she took or pictures she got with the permission of people who have visited interesting places or have interesting stories to share. She then adds some music and voila! According to Ilse, it makes her happy to read all the comments! There is also a video on Youtube of historic pictures and places of Bloemfontein! She also has a channel for children and a channel for relaxation.

Should you want to have a look at her hobby, search on YouTube for Bfn Lion Buzz, Fiela Adventures and I photo therapy by Ilse. Click on the icon of each and subscribe! You will enjoy every moment!

Ilse loves pets and currently has three cats, two rescues, one from the SPCA and one from people who moved. The third one she "rescued" from a pet shop. Believe me, these cats won the Cat Powerball and will live in love and luxury for the rest of their lives!

And then there's Bärin Björk, the Bear, all the way from Bern in Switzerland! Bärin's real life family members live in a beautiful Bear Park in Bern on the banks of the river Aare. Ilse's toy bear was a present from a friend who visited Bern!

Ilse has been working for the UFS since 5 May 1987. Her father, Martin Schwella, was an Assistant Registrar: UFS Residences and UFS Physical Resources. Ilse is currently an Officer at ICT, and she is assigned to the management of certain projects. Ilse's daughter, Ilka, studied at the UFS and is currently working in Gauteng.

Enjoy reading about this remarkable and amazing colleague and contact her if you have interesting stories to tell!

There might be a tests in labour

The respectability of polygraph evidence, at best, remains an open question, and any litigant seeking to invoke it for any legitimate purpose, must, needs be, adduce expert evidence of its conceptual cogency and the accuracy of its application in every given case.

A case involving polygraph testing came before the Metal and Engineering Industries Bargaining Council. In Endeto Engineering v MEIBC [2023] ZALCJHB 26, Mr Nkabinde, an employee of Endeto Engineering was charged with:

Gross misconduct: Dishonesty in that you made a false accusation against the CEO of the Company (Mr Raymond Lovett) to the effect that Mr Lovett was watching you relieve yourself in the bathroom on the 31st of October 2019, and/or alternatively.

Gross misconduct: Breach of an agreement signed by yourself in that you refused to undergo a Polygraph Examination on the 18th of November 2019 despite agreeing to do so on the 4th of November 2019.

According to Mr Nkabinde, he had been using a stall in the bathroom when the owner of the business, Mr Lovett, peeked over the stall wall and looked at him while he was relieving himself. Mr Nkabinde's union addressed an email to Mr Lovett that evening, calling for an apology concerning the incident. When an apology was not forthcoming, a formal grievance was lodged by Mr Nkabinde against Mr Lovett. The outcome of the grievance was that both parties must submit to polygraph testing.

Polygraph testing was arranged to take place on 18 November 2019. On 4 November 2019, Mr Nkabinde signed a "Consent to [Undergo] Polygraph Examinations as Part of Grievance Enquiry". The terms of the "consent" are as follows:

The parties agree that the employee shall undergo a polygraph examination on a date and time to be determined as part of an ongoing grievance investigation, where it has been determined that the Cautionary Rule applies.

The employee acknowledges that he/she has been placed in a position of trust within the company, as a result, the employee is required to always act in the best interest of the employer, and at all times be honest.

Refusal to undergo a polygraph test in any manner will constitute a breach in the trust relationship between yourself and the employer and will result in the inference being drawn that the allegations made by the employee are untrue.

The employee agrees to undergo a polygraph test, where the employer is investigating any incident of the commission of fraud and/or theft and/or gross dishonesty and/or gross negligence in which the employee or others may be implicated.

Mr Lovett attended the polygraph testing, and the outcome was that no deception was detected. Mr Nkabinde did not attend. Following the disciplinary hearing, Mr Nkabinde was dismissed whereafter he referred an unfair dismissal dispute to the Metal & Engineering Industries Bargaining Council. The arbitrator found that Mr Nkabinde's dismissal was substantively unfair and awarded compensation.

Dissatisfied with the outcome, the employer brought a review application – its main concern was the arbitrator's assessment of credibility, and his disregard of Mr Lovett's polygraph test results.

Regarding the polygraph, the Labour Court pointed out that:

... the inclusion of clause three, as set out above, in a document intended to be a consent to undergo polygraph testing is loaded and heavy-handed, to say the least. That the employee signed this consent is unimportant in the circumstances where clause three, among others, is not only offensive to public policy, but also offends the principles of natural justice and the interest of justice.

Even if I were wrong on the reasonableness of the arbitrator's assessment of credibility, having regard to the heavy-handed terms of the consent, Mr Nkabinde's grievance being transformed into a disciplinary hearing against him, and the disproportionate reliance on the result of Mr Lovett's polygraph test results, it is clear that dismissal was wholly unfair in these circumstances. The grievance could not have simply concluded with polygraph testing and not have provided for further steps once this was done.

The Court referred to DHL Supply Chain (Pty) Ltd v De Beer NO and Others [2014] 9 BLLR 860 (LAC) where it was pointed out that:

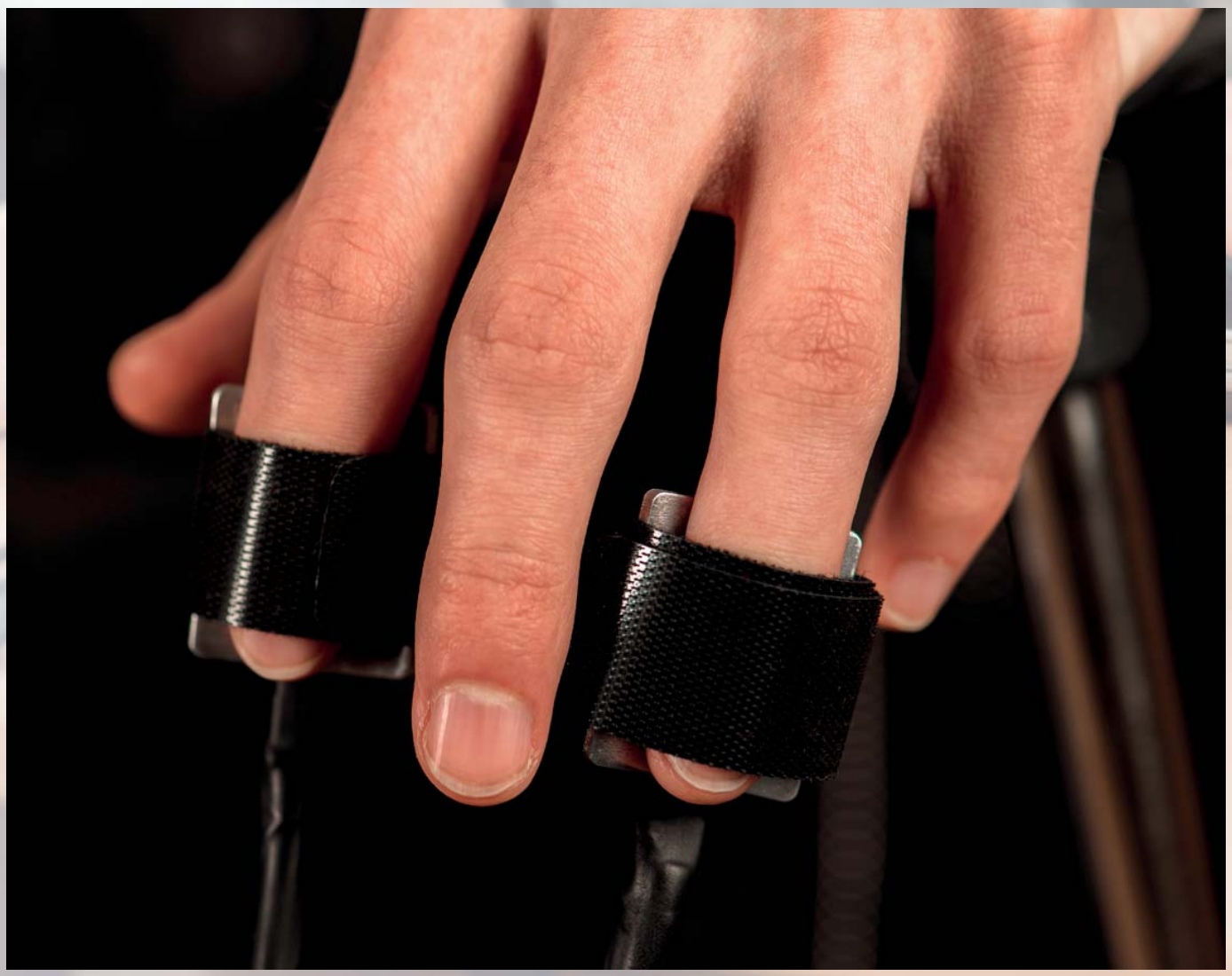
place for polygraph law matters

By Nicolene Erasmus (Director, Labour Guide)

These considerations beg the question about what a failed polygraph test really produces by way of usable information. Only the inference to be drawn from the failure of the test is useful as material to determine probabilities. In the absence of expert evidence to explain what that inference is, either generically, or within the bounds of the specific instance itself, and also to justify the explanation of what that is, there is nothing usable at all that might contribute to the probabilities. In this appeal, DHL's consent form, signed by the two respondents, states that the test would indicate that the worker was either involved or not involved in the stock loss. That premise is questionable, and to belabor the point, required the kind of expert evidence mentioned above to render it worthy of consideration.

In summary, the respectability of polygraph evidence, at best, remains an open question, and any litigant seeking to invoke it for any legitimate purpose, must, needs be, adduce expert evidence of its conceptual cogency and the accuracy of its application in every given case.

There might be a place for polygraph tests in labour law matters – however, it seems not to be a special place.



Ms Adelina Tjamela is in charge of the venues in the UVPERSU Office Complex. Adelina is passionate about her job, and she is always willing to walk the extra mile! Her beautiful smile says it all!

When our Office Manager is on leave, Adelina assists a to make sure there is always somebody to answer the phone and the doorbell.

Thank you for your huge contribution to UVPERSU's image, Adelina! You are highly appreciated!