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Shaping Our Sustainable Future through Engineering

UIPE
PREPARE FOR THE FUTURE
UGANDA INSTITUTION OF PROFESSIONAL ENGINEERS

UGANDA ENGINEERS REGISTRATION BOARD
ERB

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A Joint Newsletter for the Engineers Registration Board and the Uganda Institution of Professional Engineers.

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FOREWORD

BY ENG. DR. HARRISON E. MUTIKANGA

CHAIR, JOINT EDITORIAL COMMITTEE – THE ENGINEER

Engineering continues to play a defining role in Uganda's and Africa's transformation journey. This issue of The Engineer captures that momentum by highlighting the ideas, commitments and practical actions shaping the future of our profession. The 11th UNESCO Africa Engineering Week and 9th African Engineering Conference, successfully hosted in Kampala, convened nearly a thousand delegates from across the continent. The discussions reaffirmed a simple but powerful truth: Africa's progress depends on a strong engineering workforce, deliberate investment in technical capacity, and sustained collaboration across borders.

The issue brings together perspectives that reflect both our opportunities and our responsibilities as engineers. The feature on the African Women Engineers Forum underscores the importance of inclusivity and the value of widening participation in a field still marked by gender gaps. The coverage of the Africa Engineers Sports Gala reminds us that engineering is also a community; one strengthened by teamwork, shared identity, and the spirit of healthy competition.

The technical articles in this issue speak to the breadth of engineering practice in Uganda today. They examine opportunities and challenges in fibre-optic deployment, waste management and environmental protection, transformer manufacturing for rural electrification, bio-cementation research, and urban flood mitigation. These contributions illustrate the central role of innovation, standards, and engineering judgement in addressing national and global development challenges. They also reflect the growing depth of local expertise and the commitment of our professionals to advancing practical, evidence-based solutions.

As ERB and UIPE continue to strengthen professionalism through registration, regulation, capacity building and ethical practice, this publication remains an important platform for thought leadership. I thank all contributors and the joint editorial team for their dedication to producing a newsletter that informs, challenges and inspires our engineering community.

I invite you to engage with the ideas presented here, reflect on the lessons emerging from the continental conference, and continue championing the engineering excellence that Uganda and Africa require.

MESSAGE FROM THE CHAIRMAN

ENGINEERS REGISTRATION BOARD

PROF. ENG. HENRY ALINAITWE MWANAKI

It is with great honor that we address you through this newsletter. The newsletter is a joint production of Engineers Registration Board and the Uganda Institution of Professional Engineers This edition comes at a time when engineering is very critical in shaping Uganda's and Africa's and the global sustainable future. The 11th UNESCO Africa Engineering Week and 9th African Engineering Conference 2025, hosted here in Uganda, demonstrated the power of collaboration, innovation, and professional excellence across the continent and globally. Engineers are no longer only designers and constructors of infrastructure but also custodians of safety, champions of technological advancement, and stewards of sustainable development.

The mandate of Engineers Registration Board is to regulate and control the practice of engineering, to advise government of engineering practice, and to register and maintain a register of engineers. We have tried our level best to deliver on the mandate. Where we have not performed well, we urge members to advise us so that we have improved service delivery.

As the Engineers Registration Board, we remain committed to upholding the highest standards of professionalism and ensuring that engineering practice in Uganda promotes integrity, safety, and value for money. We continue to strengthen our regulatory function, enhance capacity through continuous development, and promote ethical practice in alignment with national priorities like the National Development Plan and global aspirations such as the agenda 2063 and sustainable Development Goals.

We call upon all engineering professionals in industry, academia, research and innovation to actively participate in mentoring young professionals, embracing emerging technologies, and leading innovative solutions to address our country's challenges. We remind all engineers to comply with the law by getting registered for those that yet to and renewing annual licenses. Let us build resilient systems, uphold professional ethics, always act professionally and improve engineering practices to have faster socio-economic transformation, climate resilience, and much desired industrialization.

Together, we can ensure an inclusive, safe and well-engineered environment for humanity.

MESSAGE FROM THE PRESIDENT

Uganda Institution Of Professional Engineers (UIPE)

ENG. BOSCO LEPI

Dear Esteemed Colleagues, Members, and Partners,

It is my honor to extend warm greetings to you through this edition of our newsletter. The Uganda Institution of Professional Engineers continues to stand at the forefront of shaping Uganda's engineering landscape, fostering innovation, and promoting professional excellence. Our role as engineers goes beyond the design and construction of infrastructure; we are architects of sustainable development, catalysts for technological advancement, and stewards of ethical practice in all sectors of society.

The 11th UNESCO Africa Engineering Week and 9th African Engineering Conference, recently hosted in Uganda, underscored the immense potential of engineering to accelerate Africa's socio-economic transformation. Bringing together engineers, policymakers, industry leaders, and academics from across the continent, the event highlighted the critical importance of collaboration, applied research, and innovation-driven solutions in addressing Africa's challenges from industrialization and infrastructure development to climate resilience and technological empowerment. The conference reaffirmed that engineering is central to Africa's future and that the decisions we make today will define the continent's trajectory for decades to come.

At UIPE, we are committed to ensuring that Uganda's engineers are equipped to meet these challenges with excellence, integrity, and vision. Through capacity-building initiatives, continuous professional development, mentorship programs, and industry partnerships, we aim to cultivate a highly skilled workforce that not only meets local needs but also competes globally. Ethical practice, adherence to standards, and a culture of innovation remain at the core of our mandate, and we encourage all members to uphold these values in every project, research endeavor, and community engagement.

Furthermore, we recognize that the future of engineering lies in empowering the next generation of engineers especially women and youth to take leadership roles, embrace emerging technologies, and drive solutions that are sustainable, inclusive, and resilient. We call upon our members to actively mentor, guide, and support young professionals, ensuring that Uganda's engineering talent continues to grow and thrive.

Finally, I express my deepest appreciation to our members, partners, regulatory bodies, and collaborators for your unwavering dedication to the engineering profession. Together, we can continue to advance infrastructure, technology, and innovation, creating a stronger, more sustainable, and prosperous Uganda. Let us embrace the opportunities before us with creativity, courage, and commitment to excellence.

ENG. BOSCO LEPI

PRESIDENT, UGANDA INSTITUTION OF PROFESSIONAL ENGINEERS (UIPE)

11th UNESCO Africa Engineering Week & 9th African Engineering Conference 2025: Advancing Africa's Socio-Economic Transformation

The 11th UNESCO Africa Engineering Week (AEW) and 9th African Engineering Conference (AEC) took place from 14th - 20th September 2025 at the Speke Resort Convention Center, Munyonyo, Kampala, Uganda. The event convened 946 participants from 26 African countries, including engineers, policymakers, academics, industry leaders, and government representatives, under the theme: "Leveraging Engineering Innovations and Technology to Accelerate Africa's Socio–Economic Transformation." Organized by the Uganda Institution of Professional Engineers (UIPE) in partnership with the Federation of African Engineering Organisations (FAEO), Science Technology and Innovation (STI) Secretariat, and the Ministry of Works and Transport(MoWT), the conference provided a platform to explore how engineering and technology can drive industrialization, innovation, and sustainable development across Africa.

The event was graced by His Excellency, the President of the Republic of Uganda, Yoweri Kaguta Museveni. Represented by the Hon. Anita Annet Among the Speaker of parliament. President Museveni emphasized that science, technology, and engineering are the continent's engines of progress. He called on African nations to leapfrog missed industrial revolutions, strengthen technological capacity, and build a skilled middle class. He also stressed that industrialization is not resource abundance but is the key to Africa's future, urging leaders to embed engineering and innovation across sectors such as agriculture, industry, Information Communication and Technology, and public service. "Stop admiring the problem. Act now. Industrialize Africa. Lead with engineering and innovation," he declared.

Conference sessions explored how engineering innovations can accelerate Africa's socio-economic transformation.

- Under Industrialization & Economic Growth, participants discussed scaling engineering capacity through university-industry partnerships, establishing research labs and factories, and developing Intellectual Property frameworks to grow Africa's $3.4 trillion economy.

- The Sustainable Infrastructure, Transport & Urban Development session highlighted resilient, low-carbon, and inclusive urban planning. Presenters shared lessons from international and local case studies, including Masdar City's integrated energy and mobility solutions, flood-resilient rural masonry bridges in Uganda, cost-effective reinforced masonry beams, Artificial Intelligence (AI) -driven construction management, and Uganda's electric mobility strategy.

- The Renewable Energy & Climate-Resilient Engineering session emphasized pairing technical solutions with supportive governance and scalable pilots. Examples included peer-to-peer energy sharing, sustainable water recycling systems, plastic-to-fuel pyrolysis, and governance-focused transport initiatives.

- In Agriculture, Water & Food Security, discussions highlighted AI-driven irrigation and crop management, solar-powered farm automation, biowaste valorization into animal feed and fertilizer, and waste-to-energy systems converting plastics into fuels and low-carbon building materials.

- The Engineering Capacity Building & Education session underscored human capital as Africa's most valuable asset. Participants recommended curriculum reform, competence-based education, mentorship programs reaching thousands of students, industry partnerships, accreditation harmonization, indigenous knowledge integration, and regional mobility frameworks to strengthen internal capacity.

Special forums emphasized inclusion, leadership, and innovation as seen below

- The Women in Engineering Forum, chaired by Eng. Diana Keesiga, spotlighted female engineers as leaders, innovators, and mentors. Participants highlighted mentorship, workplace equity, leadership development, and systemic barriers that keep female representation in engineering below 10% in most countries.

- The Young Engineers Forum provided a platform for emerging professionals to discuss career development, entrepreneurship, innovation, and gender inclusivity, stressing structured mentorship and cross-border mobility.

- The Industry Actors Forum called for linking patents to markets, investing in talent, ensuring construction quality, and fostering collaboration between industry, academia, and regulators.

- The Registrars & Local Governments Forum focused on harmonizing engineering standards, professional mobility, regulatory frameworks, capacity building, and strategies to curb brain drain.

- The CEOs Forums on water and energy utilities examined infrastructure financing, renewable energy adoption, rural electrification, cross-utility collaboration, climate-resilient systems, and talent pipelines for youth and women. Participants emphasized the need for actionable roadmaps, monitoring performance, and strengthening trust in local engineers.

- The Energy Utility & Engineering Forum, chaired by Eng. Ireen Kabazira and Eng. Henry Mpuuga, highlighted industrialization challenges requiring not only technical excellence but also ethical governance, regional policy harmonization, R&D investment, and collaborative, locally-driven problem-solving approaches across ICT, biofuels, resilient infrastructure, fuel quality, and mechanization.

A major milestone of the conference was the launch of CUED-U: Consortium of University Engineering Deans in Uganda, chaired by Eng. Dr. Henry K. Ntale. CUED-U aims to harmonize curricula, strengthen quality assurance, pool infrastructure resources, foster industry linkages, and create research and innovation hubs. Hon. Dr. Monica Musenero, Minister of Science, Technology & Innovation, highlighted engineers as custodians of national wealth and called for competence-based, practical, and industry-responsive education.

The Gala Dinner and Awards Ceremony, celebrating Africa's engineering talent and cultural diversity. Recognition was given to individuals, sponsors, partners, and the Local Organizing Committee for their contributions.


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AWARDS
GALA


INNOVATIONS

During the Closing Ceremony, chaired by Hon. Dr. Monica Musenero, delegates were urged to translate innovation into economic transformation. Resolutions emphasized competence-based, industry-linked education, industrialization and innovation ecosystems, resilient and climate-smart infrastructure, renewable energy adoption, youth and gender empowerment, and strengthened financing and governance. A Ministerial Communiqué will guide follow-up actions, with countries reporting progress at the 12th UNESCO African Engineering Week in Tanzania, supported by a FAEO monitoring dashboard.

The conference concluded with a ministerial declaration outlining nine strategic areas to advance Africa's development. These included: Education & Capacity Building, focusing on curricula reform, mentorship, and digital skill development; Industrialization & Innovation, promoting research ecosystems, IP frameworks, and resilient value chains; Infrastructure & Sustainability, emphasizing climate-resilient and cost-effective technologies; Agriculture & Food Security, through climate-smart practices and regenerative models; Water & Energy Security, ensuring reliable, sustainable access and renewable energy adoption; Governance & Regulation, harmonizing standards and enforcing ethics; Collaboration & Partnerships, fostering public-private and cross-border linkages; Financing & Accountability, increasing investment with transparency; and Youth & Gender Empowerment, scaling mentorship and leadership opportunities.

Across technical sessions, forums, and ministerial discussions, a clear message emerged: **engineering and technology are central to Africa's socio-economic transformation.** From masonry bridges to AI-driven irrigation systems, renewable energy innovations, climate-resilient infrastructure, and reforms in education and governance, Africa can achieve industrialization, economic growth, and self-reliance by leveraging local innovations, inclusive policies, youth and women empowerment, and collaborative partnerships. The 11th UNESCO Africa Engineering Week and 9th African Engineering Conference marked a milestone in Africa's journey toward engineering-led development, sustainable solutions, and ethical leadership, providing a roadmap to move decisively from dialogue to actionable results.

WOMEN IN ENGINEERING:

SHAPING AFRICA'S SUSTAINABLE FUTURE

Highlights from the 8th African Women Engineers Forum at Africa Engineering Week & Conference 2025

ENG. DIANA KEESIGA

Vice President, Public Relations Practice And Ethics (Session Chair), UIPE

The 8th African Women Engineers Forum, held under the theme "Inclusive Engineering – Women Leading Innovation for Africa's Sustainable Future," offered an inspiring platform to celebrate and amplify the role of women engineers as innovators, mentors, and leaders. The Forum spotlighted women's leadership in developing inclusive, innovative, and sustainable solutions for Africa's growth while addressing persistent barriers to participation in science, technology, and engineering fields.

KEY REFLECTIONS

1. Empathy as a Leadership Value

The Guest of Honour, Eng. Irene Pauline Batebe, Permanent Secretary at the Ministry of Energy and Mineral Development (Uganda), called upon women to embrace empathy as a defining leadership trait and a source of resilience. She reaffirmed Government's commitment to gender inclusion in infrastructure and technical professions.

> "Never underestimate your empathy. It is this quality that fuels women's leadership values"
>
> ENG. IRENE PAULINE BATEBE
> Permanent Secretary
> Ministry of Energy & Mineral Development

She advanced three priority ideas:

Diversity in Innovation

Innovation is strengthened when women's lived experiences inform design and implementation, ensuring projects respond to the needs of people at the last mile.

Empowerment through Mentorship and Access

Mobilizing mentorship, peer networks, and funding opportunities is critical to overcoming barriers such as limited financing, inheritance restrictions, and weak entrepreneurial support.

Sustainability as a Mindset

Every engineering intervention whether in roads, bridges, ICT, water, or energy should be guided by sustainability, leaving communities and the environment better than before.

She concluded with a rallying call for women engineers to enter leadership spaces not as tokens, but as competent professionals whose competence, empathy, and innovation will shape Africa's future.

2. Resilience and Leadership in Action

Keynote speaker Eng. Ester Christopher shared her journey of perseverance, rising from hardship to founding a successful engineering enterprise in Tanzania. Her story epitomized grit and purpose in a male-dominated profession.
She revealed stark statistics: women represent under 7% of professional engineers in Africa though countries like Uganda and Tanzania have risen from 2% to 10% within a decade. Despite slow progress, she highlighted women innovators creating solar-powered medical carriers, eco-stoves, and off-grid systems as evidence of women's transformative power.

> "Excellence has no gender"
>
> ENG. ESTER CHRISTOPHER
> Founder and Managing Director of Meritech Ltd, Tanzania

3. Testimony: From Adversity to Impact

Jacquiline delivered an emotional testimony of transformation, from being orphaned at 16 to becoming a chemical engineer and entrepreneur. Supported by the Forum for African Women Educationalists (FAWE), she credited mentorship and scholarships for changing her life trajectory. She now leads an agribusiness and consultancy firm, embodying how education and support can turn vulnerability into leadership.

> "We must reach girls in rural areas early before they are lost to self-doubt or social limits."

Key Recommendations and Outcomes

The Forum consolidated actionable recommendations for advancing women's inclusion in engineering:

- Mentorship and Pipeline Development – Scale role models, mentorship, and targeted programs to increase STEM participation and retention for girls and young women.
- Workplace Equity and Support – Introduce gender-responsive policies on maternity, work–life balance, fair recruitment, promotion, and pay.
- Leadership and Influence – Equip women engineers with management and leadership skills to move beyond technical roles into decision-making spaces.
- Data and Accountability – Establish key indicators to measure and track women's participation in engineering, guiding evidence-based policy.
  Address Systemic Barriers – Tackle cultural norms, stereotypes, sexual harassment, and discrimination that hinder women's progress.
- Policy Advocacy – Encourage governments, academia, and professional bodies to institutionalize gender diversity policies, expand scholarships, and create targeted initiatives.
- Engineering Excellence Has No Gender – Reaffirm that innovation and competence—not gender—drive excellence. Women must be recognized as leaders and innovators in delivering Africa's socio-economic transformation.

Conclusion: Women as Architects of Change

The Forum affirmed that women engineers are not merely participants but architects of Africa's sustainable transformation. Their stories, ideas, and leadership reaffirm that inclusion fuels innovation and that innovation drives sustainable development.

> "When women lead, communities thrive, and sustainability becomes possible."

We acknowledge FAWE and GIZ for the financial support offered to make the Women Forum a resounding success.

Africa Engineers Sports Gala 2025: Uniting Africa Through Sport, Culture, and Engineering Excellence

MR. KIDDU ANDREW KAWUKI

Vice Chairperson, UIPE Kampala Branch
Chairperson, Africa Engineers Sports Gala Sub-Committee

In a vibrant display of unity, energy, and African pride, the Uganda Institution of Professional Engineers (UIPE) hosted the African Engineers Sports Gala 2025, a high-spirited continental event that blended sportsmanship with cultural celebration. The African Engineers Sports Gala was graced by Hon. Gen. Edward Katumba Wamala, Minister of Works and Transport as the chief Guest.

The gala served as a curtain raiser for the 11th UNESCO Africa Engineering Week and 9th African Engineering Conference, both hosted in Uganda. The event took place on 14th September 2025 at Nakivubo (Hamz) Stadium. Over 400 participants representing 22 professional bodies, corporate companies, and engineering institutions from across Africa gathered for a day of competition, camaraderie, and continental connection.

The gala's objectives were clear and deeply impactful:

- To promote unity and healthy competition among African engineers.
- To foster collaboration between professionals, students, and development partners.
- To showcase African cultural diversity through traditional games and performances.
- To promote health and wellness, reminding engineers of the importance of physical fitness in professional life.

The event kicked off with a lively aerobics and dance session, setting an energetic tone for the day. The aerobics and athletics sessions underscored the importance of wellness and fitness as essential elements of a balanced professional life. Many participants expressed how refreshing it felt to engage outside office settings, emphasizing that sports strengthen both body and teamwork.

The UIPE African Sports Gala was not just about competition it was about connection. Teams competed in over 15 sports disciplines, including:

Outdoor Games	Indoor Games	Traditional Games	Fun Games
Athletics ▸ 100 M Race ▸ Relays ▸ Sack Race ▸ 3 Leg Race ▸ Egg Spoon Race	Gym ▸ Aerobics ▸ Dance ▸ Cardio, Yoga	Kwepena	Mini Golf
Basketball	Chess	Sonko	Cornhole
Netball	Draughts	Bladda	Ringtoss,
Volleyball	Darts	Duulu	Jenga
Handball	Scrabble	Amahiri	
Baseball Five	Pool Table	Omweso	
Football	Table Tennis	Tug Of War	
		Ludo	

Participating teams were grouped into four (4) categories as below

Sn	Group / Classification	Name
1	Category A	Professional Bodies
2	Category B	Corporate Companies
3	Category C	Institutions' Engineering Bodies / Societies
4	Category D	Foreign Delegates and Local Individuals

Category A: Professional Bodies

Sn	Professional Body
1	UIPE (Uganda Institution of Professional Engineers)
2	UIPE – SACCO
3	UIPE – Arua branch
4	ERB (Engineers Registration Board)
5	UNABSEC (Uganda National Association of Building and Civil Engineering Contractors)
6	NBRB (National Building Review Board)
7	STI (Science, Technology, and Innovation)
8	USA (Uganda Society of Architects)
9	UACE (Uganda Association of Consulting Engineers)
10	SPPPU (Society of Professional Physical Planners of Uganda)
11	ULS (Uganda Law Society)

Category B: Corporate Companies

Sn	Company
1	Pepsi Co. Ltd
2	Sandhbolt Limited
3	Kejstrong Technical Services
4	Pedrew Engineering Company Limited
5	Joadah Consulting Engineers
6	National Water & Sewerage Corporation (NWSC)
7	Eco Concrete
8	Uganda Civil Aviation Authority (UCAA)
9	Ministry of Works & Transport
10	Kiira Motors
11	Heartland
12	Area UG

Category C: Universities and Tertiary Institutions Students Associations

Sn	Company
1	Makerere Engineering Society (MESS)
2	Ndejje University Engineering Society (NUESA)
3	Hightech International Institute Engineering Society (HIIES)
4	Kyambogo University Engineering Society (KYUES)
5	Muteesa 1 University Engineering Society
6	Busitema University Engineering Society
7	Victoria University Engineering Society
8	Uganda Christian University Engineering Society
9	International University Of East Africa Engineering Society
10	Buganda Royal Institute Engineering Society

A carefully designed weighted scoring system ensured fairness and encouraged both physical skill and intellectual strength, embodying the perfect balance of engineering precision and athletic excellence. As the games unfolded, the competition grew intense every goal, basket, and sprint fueling cheers from the stands. When the final whistle blew, the results told a story of determination and teamwork:

1. Busitema University emerged as overall champions with 27.1 points, excelling in Soccer, Athletics, and Fun Games.
2. Hightech International Institute followed closely with 26.95 points, performing exceptionally in Athletics and Fun Games.
3. National Water and Sewerage Corporation (NWSC) came third with 25.55 points, dominating in Volleyball, Handball, and Pool.

The 2025 gala stood out for how seamlessly it integrated sports, networking, and cultural exchange. Between games, participants shared experiences, built friendships, and even danced to traditional beats performed by local troupes. The event fostered cross-border collaboration, creating new professional and personal bonds that transcended nationality and discipline. Cultural games such as Omweso, Kwepena, and Amahiri throwing brought nostalgia and laughter, reminding everyone that Africa's strength lies not only in innovation but also in heritage. In an era where engineers often face demanding schedules, the gala championed the message of "Healthy Engineers, Productive Professionals."

The success of the African Engineers Sports Gala 2025 was made possible through the collaborative effort of the UIPE Council, FAEO, Africa Engineering Week Sports Gala Sub-Committee, chaired by Mr. Kiddu Andrew Kawuki, and various corporate sponsors and partners. "The gala reflected Africa's unity through diversity. Engineers came together not just to compete, but to celebrate shared identity and strength as one community." As participants left Nakivubo Stadium at sunset, the smiles, laughter, and new friendships testified that this was not just another sports event, but a milestone in Africa's journey toward unity through collaboration and culture.



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WE CAN DO BETTER WITH FIBRE OPTIC CABLE PROVISION

ENG. TURIHOHABWE ALEX

Fellow, UIPE and is a Continental Finalist in Bussiness and Professional Sector, CEO Global 2017 and Honorary Secretary Fidic Africa.

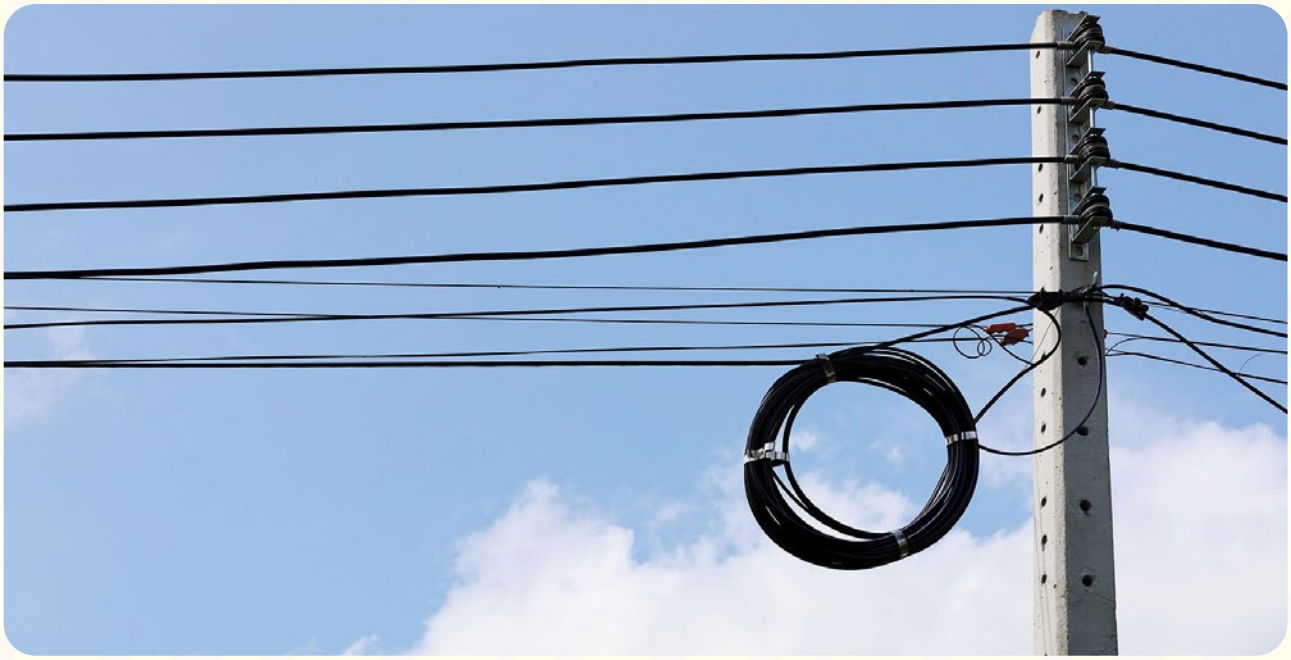
In today's digital era, internet connectivity is no longer a luxury it's a lifeline for work, business, and social connection. The expansion of fibre optic infrastructure has become essential to ensuring reliable, high-speed, and affordable internet access for Ugandans. With the growing number of people using smartphones and other smart devices, the demand for faster and more stable internet continues to rise.

Several companies including Simba Fiber, CanalBox, MTN Fiber, and Zuku Fiber are making commendable strides to provide these much-needed services. Their efforts are transforming how Ugandans connect, work, and communicate. Equally, we appreciate the Uganda Communications Commission (UCC) for creating an enabling environment that allows such companies to operate and innovate freely.

The increasing number of service provider's benefits both consumers and the economy. It encourages competition, which drives efficiency, affordability, and service quality. Citizens can now choose providers that best meet their needs, while the country benefits through tax revenue generation and employment creation.

In areas where fibre services are already operational, users have expressed satisfaction with both the speed and cost-effectiveness compared to the constant purchase of mobile data bundles. Fibre internet also benefits families and small businesses by serving multiple users at once, making it both practical and economical.

However, while Kampala and its surrounding areas are seeing progress, other upgraded cities such as Jinja, Mbale, Soroti, Mbarara, Fort Portal, Hoima, Gulu, and Arua are eagerly waiting for similar



developments. Timely communication from UCC regarding rollout plans in these cities would help manage public expectations and enhance transparency. Often, citizens are only made aware of such projects when they begin, leaving communities unprepared for disruptions or opportunities.

While the expansion of fibre optic infrastructure is commendable, the manner in which it is being implemented raises concern. A look at Wampewo Avenue and Kalonda Rise on Kulambiro Hill in Nakawa Division reveals a disorganized picture. Multiple companies are installing separate poles sometimes five or six in the same location with cables running at awkward angles, creating visual clutter and compromising the urban aesthetic.

This approach, though perhaps practical in the short term, diminishes the quality of our public spaces. The sight of overlapping, multi-coloured cables gives an impression of disorder and poor coordination something that can easily be avoided through better planning.

Instead of each company erecting its own poles, a shared infrastructure model could be adopted. The UCC, or a designated infrastructure manager, could own and regulate a single set of poles, fitted with standardized crossbars. Each provider could then attach their cables to the same pole using coded slots or identifiers.

This concept borrows from electric power distribution systems, where several power lines share one pole in an organized manner. Such an arrangement would reduce costs, minimize visual clutter, and enhance safety and maintenance efficiency.

Ultimately, the ideal solution is underground cabling a cleaner, safer, and more sustainable option. While the cost of materials, labour, and potential interference with existing utilities may currently make it challenging, future urban planning and infrastructure designs should incorporate conduits for underground utilities. This foresight will ensure future installations are neat, efficient, and aligned with modern urban standards.

The progress made so far in expanding Uganda's fibre optic network is commendable. However, we can and must do better. UCC, as the sector regulator, holds the key to ensuring that service providers adopt practices that reflect order, beauty, and professionalism in our urban spaces.

Let Kampala's current experience be a lesson and opportunity for improvement not a model to replicate across Uganda's emerging cities. By embracing better planning and coordination, we can build an internet infrastructure that not only connects us faster but also reflects the quality and discipline of a modern, forward-looking nation.

ENGINEERING THE ENVIRONMENT THROUGH WASTE MANAGEMENT

ENG. ROBERT K. TUSIIME

Project Waste Services Manager, Tilenga Project Under The Albertine Waste Management JV And White Nile Consults Limited

As Uganda ushers in the 2025/26 financial year, the nation has begun implementing the Fourth National Development Plan (NDP IV) a framework designed to accelerate progress toward the Sustainable Development Goals (SDGs) 2030. Among its key focus areas is waste management, a challenge that has become increasingly urgent amid rapid urbanization, population growth, and industrial expansion.

The plan underscores the need to build human resource capacity to support sustainable urban development and housing. It warns that poor waste management can lead to disasters, loss of life and property, and diminished productivity.

Against this backdrop, engineering stands at the heart of the solution offering tools, innovations, and systems thinking to turn waste from a burden into a resource. Through engineering, Uganda can align its development with global sustainability goals.

"Engineering simplifies human life but it must also safeguard the environment that sustains it."

The oil and gas sector stands out for its progress in waste valorisation converting waste into valuable materials. This mirrors circular economy principles, where waste is reimagined as an input for new production rather than an end product. In such models, waste disposal to landfills becomes the last resort.

Modern regenerative and circular approaches emphasize designing systems that reduce extraction and minimize waste. These involve rethinking materials, manufacturing, and consumption patterns ensuring that reuse, repair, and recycling come before disposal.

Historically, the environment could absorb much of humanity's waste. But with today's population and consumption levels, natural systems can no longer keep up. Engineering innovation is now vital to restore the balance.

Engineering must go beyond construction and manufacturing it should lead the design of resilient waste management systems.

This includes technologies that capture, treat, and convert waste into usable forms, ensuring minimal environmental impact. Through interdisciplinary collaboration, engineers can integrate design, ethics, and policy to create efficient, scalable solutions.

Waste management is, therefore, not just a technical matter it is a moral and professional responsibility.

While engineering provides tools, human behaviour determines outcomes. Change begins with awareness. Incorporating environmental education into school curricula can help the next generation view responsible waste disposal as a lifestyle, not an obligation.

The National Environment Management Authority (NEMA) recently proposed fines for littering from vehicles. Though well-intentioned, enforcement has been difficult, with penalties sometimes exceeding the value of older vehicles. This reflects a deeper need: behavioural change over punishment.

Waste segregation at the source remains one of Uganda's biggest challenges yet it is the most important first step toward effective waste management.

"Waste management begins not at the landfill, but at the moment of choice how we buy, use, and discard."

Uganda's waste sources vary widely: Domestic and tertiary waste from homes, schools, and markets, Industrial waste from production and manufacturing, Municipal solid waste from densely populated areas and Transport waste from vehicles and road infrastructure

Engineering interventions are needed to reduce pollution from delayed road projects, poor dust suppression, and ineffective disposal systems.

Agricultural waste, though organic, contributes to greenhouse gases like methane during decomposition. Studies show that Kampala's waste is largely organic, making biomass and composting technologies critical.

Globally, innovations such as biogas-powered public buses in Europe show what is possible when engineering meets environmental need.

The financial and environmental costs of inaction are enormous. The National Water and Sewerage Corporation (NWSC) has been forced to expand intake points on Lake Victoria including a new one in Katosi due to pollution. These are costly, short-term solutions.

Sustainable progress depends on identifying major polluters and supporting them in adopting cleaner production methods. Engineers, policymakers, and regulators must work together to ensure environmental ethics guide every decision.

Air pollution from open burning of plastics, industrial exhaust, and heavy charcoal use is now a major health threat. It contributes to the rising incidence of non-communicable diseases (NCDs) and respiratory conditions. Addressing emissions is not optional it's a public duty.

The Tilenga Project offers a benchmark for success, having achieved over 70% waste valorisation. Treated wastewater is reused for dust suppression, irrigation, and sanitation, while organic compost supports landscaping and land restoration.

Similar approaches should be adopted in automotive, transport, and agriculture sectors through: Importation of vehicles with functional emission systems, Promotion of mass transit and electric vehicles and Use of biogas digesters, composters, and vermi-composting for renewable energy and organic fertilizer production

E-waste (discarded electronics) presents a new frontier challenge. However, Uganda is seeing progress as some local entities begin recycling electronic waste demonstrating that engineering innovation can thrive even in resource-limited contexts.

"Engineering transforms problems into possibilities and waste into wealth."

Engineering is central to the environmental equation. Through innovative design, technology, and ethical practice, engineers can help Uganda transition toward a cleaner, circular, and sustainable future.

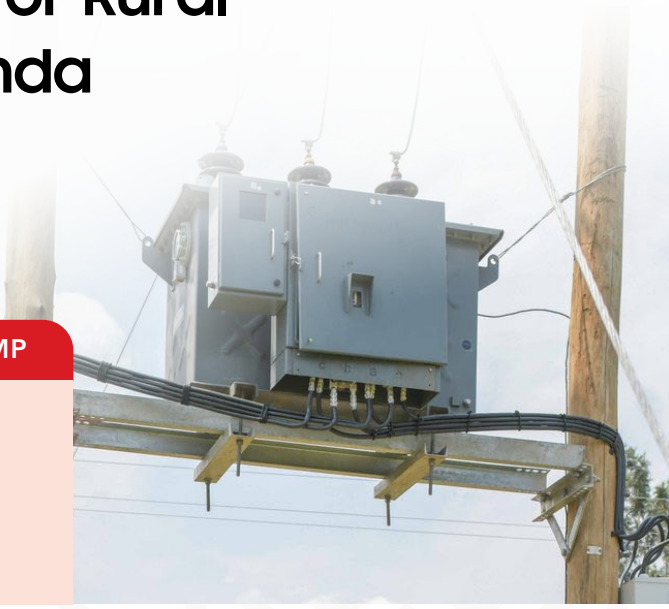
As we strengthen laws, standards, and policies, we must remember that every engineer has a role to play from design and manufacturing to construction and policy advocacy.

Ultimately, waste management is not just an environmental obligation, it is an engineering mandate that defines our commitment to sustainability, humanity, and generations to come.

Distribution Transformer Manufacture, Testing and Commissioning for Rural Electrication Projects in Uganda

ENG. OOLA JIMMY NOEL SANDE, PMP

Principal Energy Officer, Rural Electrification Department - Ministry of Energy and Mineral Development



ABSTRACT

Transformers are found at power generation plants, along transmission lines and at distribution points for final consumers of electricity. The focus of this article is distribution transformers rated 33kV and 11kV.

The Government of Uganda is committed to providing electricity to households which comes with installation of distribution transformers. For rural electrification projects, specifications for transformers are made. The specifications define the different features of the transformer and these will guide in the manufacture.

The quality of the manufactured transformers is directly dependent on the technical specifications. After the specifications have been defined, the manufacturer will produce drawings and design details. The client reviews and approves designs before manufacturing can take place. The design of the transformer type is normally tested during type tests in internationally recognized laboratories. During and after manufacture, routine & factory acceptance tests are carried out before delivery to the client. On delivery, transformers are installed in the field and tests carried out before commissioning. On commissioning, the distribution transformers will now be ready to supply power to customers.

Keywords: **Manufacturing, Specifications, Tests**

1. INTRODUCTION

According to IEC 60076 – 1, a power transformer is: A static piece of apparatus with two or more windings which, by electromagnetic induction, transforms a system of alternating voltage and current into another system of voltage and current usually of different values and at the same frequency for the purpose of transmitting electrical power [1].
Transformers are found in many industries with varying ranges of power. It is used in the electricity supply industry from generation, transmission and distribution and can be categorized as power or distribution transformers. Power transformers have higher rating and are normally found in power stations and substations. The typical voltage ratings for power transformers in Uganda are 400/33/11kV, 220/33kV, 132/33/11kV 33/11kV while distribution transformers handle less power and are rated 33kV/415/240V, 11kV/415/240V.

A transformer consists of a core onto which windings are placed. These are then housed in a tank and filled with mineral oil which acts as an insulating medium as well as for cooling purposes. Other accessories including the bushings where the leads from the windings are connected, oil level gauge, temperature gauge where applicable, oil drain valve, earthing points, etc.

2.1 USER REQUIREMENTS

A good distribution transformer starts with a good technical specification. The technical specifications are normally defined by the user department (customer). Transformer specifications detail a device's key electrical and physical characteristics, including rated power (kVA), voltage ratings (HV/LV), impedance, frequency, winding type, cooling method, and dimensions. They ensure the transformer meets performance standards, such as those from IEC 60076 and IEEE C57.12 and are suitable for its intended application.

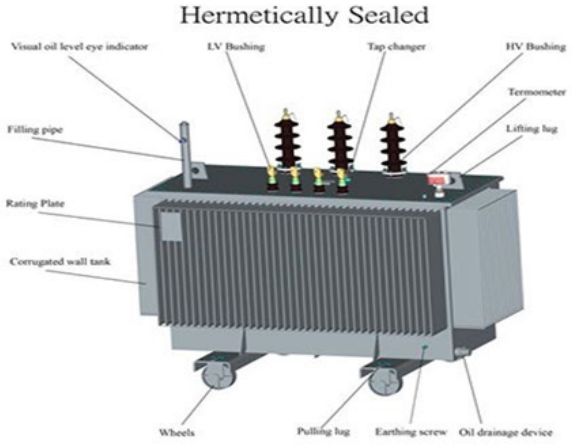
2.2 TYPES OF DISTRIBUTION TRANSFORMERS

2.2.1 Conservator Type Transformer

A conservator type transformer utilizes an external, cylindrical tank, or conservator, to manage the oil's expansion and contraction due to temperature changes, acting as an oil reservoir to maintain consistent oil levels and quality.

2.2.2 Hermetically Sealed Transformer

A hermetically sealed transformer is a totally sealed transformer whose internal insulating oil is completely isolated from the external atmosphere.



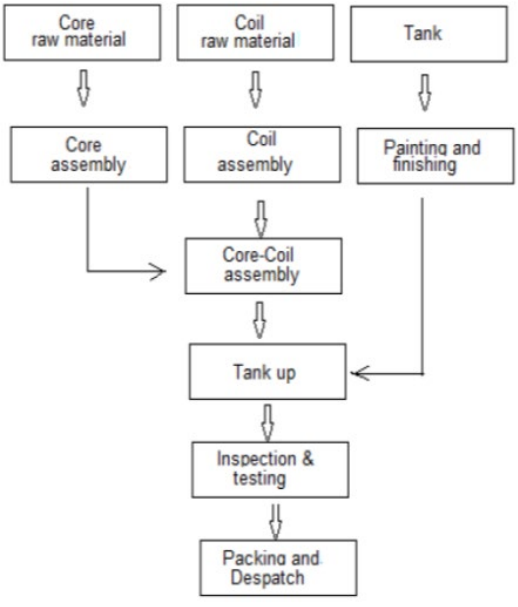
2.2.3 Dry Type Transformer

A dry-type transformer is an electrical transformer that uses air or other dry insulation instead of liquid for cooling and insulation, making it inherently safer by eliminating fire hazards and oil spillage risks.

2.2 TRANSFORMER MANUFACTURING

Manufacturing is the process of turning raw materials into finished goods or products. Transformer manufacturers assemble many components and products in order to make a complete transformer. The raw materials come from other manufacturers.

The various stages in producing a transformer are Design, Winding, Core Building, Assembly, Tanking and Testing which is shown in the flow chart below.

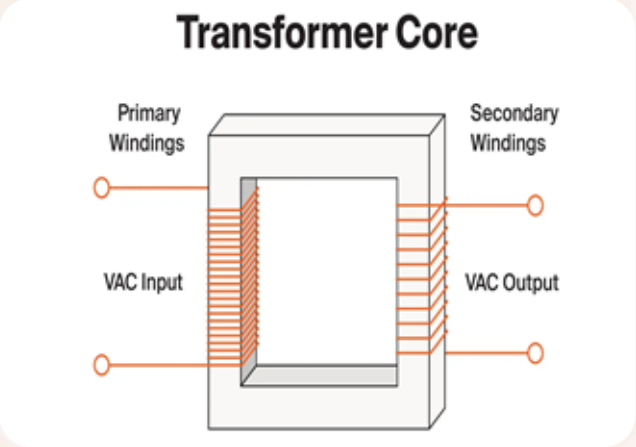


3.1 Transformer Design

Transformers are designed on specialized software for: Cost optimization over a lifetime, based on material cost & loss capitalization as specified by customers [4].

3.2 CORE ASSEMBLY

Cold-rolled grain-oriented (CRGO) silicon steel is the primary raw material. It comes in thin sheets that are cut to the appropriate size according to the pattern. These laminations are put together such that there isn't any air space between the joints of two sheets that follow one another. The core channel is a frame on which the entire assembly is completed. These frames serve as the core assembly's clamping support.



3.3 WINDING (COIL) ASSEMBLY

High Voltage Coils:

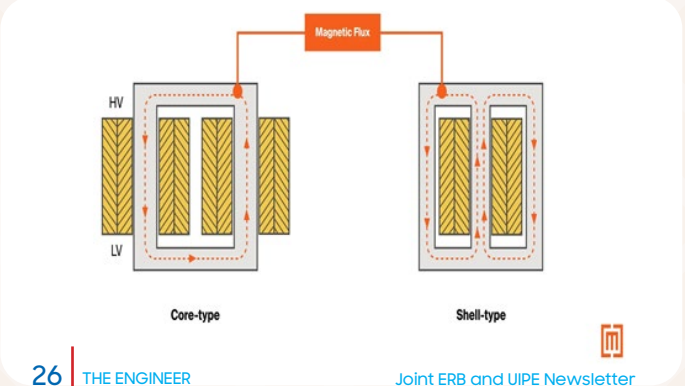
A solid cylindrical former of predetermined diameter and length is used as the limb. Generally, round insulated wire of either copper (Cu) or Aluminium (Al) is used as basic raw material

Low Voltage Coils:

L.V. Coils are also one of the components of the transformer. The procedure of making a low voltage coil is generally the same as described above. The shape of the basic raw material (Al or Cu) is rectangular

3.4 CORE – COIL ASSEMBLY

The components produced in the coil winding and core assembly stages are taken into the core-coil assembly stage.



3.5 TANKING

All tanks are made of high-quality steel and can withstand vacuum. Fittings and accessories as per the customer's specification and drawing are checked. The core-coil assembly and tank are taken into the tank-up stage [7]. Once the transformer is tanked up and the tank sealed, then the testing of the transformer commences.

4 TRANSFORMER TESTING

Every engineering material is subjected to tests to ensure that it conforms to both national and international standards.

4.1 TYPE TESTS

To prove that the transformer meets customer's specifications and design expectations, the transformer has to go through different testing procedures in manufacturer premises. Some transformer tests are carried out for confirming the basic design expectation of that transformer. These tests are done mainly in a prototype unit not in all manufactured units in a lot. Type test of transformer confirms main and basic design criteria of a production lot [3].

4.2 ROUTINE TESTS

Routine tests are normally conducted by the manufacturer on all transformers and test report issued for each. The report is then given to the customer for review. The customer is normally invited for Factory Acceptance Tests (FAT) while the transformers are still at the manufacturer's premises. The tests are conducted on a sample of the transformers to ensure conformity with the specifications and customer requirements.

During Factory Acceptance Tests (FAT), the following routine tests are normally undertaken:

a) Physical inspection of the transformers, checking creepage distance of the MV bushings, checking labelling, accessories and overall dimension of transformer tanks.

b) Insulation resistance between HV – LV, HV – E and LV – E.

c) Transformer turns ratio measurement for all the 5 taps of the no-load tapchanger.

d) A sample of new transformer oil is tested to get the Breakdown Voltage for the oil that is filled in the transformers.

e) Separate source voltage withstand is done for high voltage side.

f) Induced over voltage at high frequency is done for the LV windings.

g) No load loss

h) Load loss

i) Winding resistance measurement

j) Confirmation of vector group

4.3 COMMISSIONING TESTS

When transformers are manufactured and delivered to the customer, they are installed in the field. For rural electrification projects, there are normally two tests carried out before the transformer is put into use.

4.3.1 Pre Commissioning Tests

These tests are carried out on the transformer when not energized and include insulation resistance between HV & LV, HV & earth and LV & earth; resistance for the surge arrestors and earth resistance.

4.3.2 Commissioning Tests

During commissioning, the transformer is energized and no-load voltage measurements taken. Any abnormal sound is also noted if available before the transformer is declared commissioned and ready for use.

5 CONCLUSION

Distribution transformers are an important component contributing to increase in electricity access through the implementation of rural electrification projects. Quality transformers are manufactured as per the technical designs specified by the customer. Tests are normally carried out at different stages of the transformer lifecycle to ensure they perform as specified.

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Enzymatic Stabilization of Weathered Granite Sand Through Cellulase-Induced Cellulose Breakdown: a Sustainable Bio-Cementation Approach

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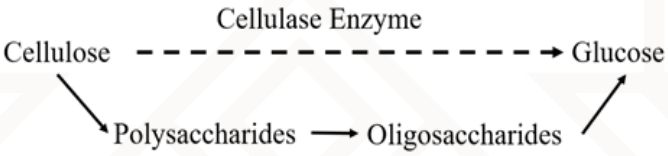
INTRODUCTION

Weathered granite sand presents geotechnical challenges due to its low strength, high permeability, and susceptibility to erosion (Mugula et al., 2025). Traditional stabilization methods using cement and lime contribute to carbon emissions and environmental degradation. As a sustainable alternative, this study explores cellulase enzyme-induced hydrolysis of carboxymethyl cellulose (CMC) for soil stabilization.



The enzymatic reaction produces biopolymers (mainly polysaccharides and oligosaccharides) (Sprenger et al., 2021) that enhance particle bonding, forming a cohesive matrix that improves soil strength, reduces permeability, and increases erosion resistance (Chang et al., 2014). The objective is to evaluate the potential of this enzymatic bio-cementation for improving soil stability (Mugula et al., 2024), providing an eco-friendly and cost-effective solution for construction in areas prone to heavy rainfall and seismic activity.

Methodology

The experimental study was conducted under controlled laboratory conditions to analyze the effects of cellulase-induced bio-cementation on the mechanical properties of Masado sand. The following procedures were followed:

Materials and sample preparation

Granite sand was collected from Semuto, Nakaseke district, Uganda. It was dried and sieved through 2mm aperture sieve to eliminate over-size particles. Commercially sourced cellulase enzyme was used to ensure consistent performance. CMC, a water-soluble cellulose derivative, served as the substrate for enzyme hydrolysis. The samples were prepared by thoroughly mixing the sand with CMC and distilled water to achieve uniform distribution, followed by the introduction of the cellulase enzyme to initiate the enzymatic reaction.

Experimental design

To assess the influence of enzyme concentration on strength development, two cellulose-to-enzyme ratios (1:1 and 1:2) were tested. Temperature effects on enzyme activity were investigated by incubating samples at 20°C, 30°C, and 40°C.

Strength development over time was evaluated by testing the samples at incubation periods of 1, 3, 7 and 14 days.

Testing Procedure

This involved enzymatic hydrolysis, where CMC was hydrolyzed by cellulase to produce glucose and other biopolymers, such as polysaccharides and oligosaccharides, which contributed to soil particle bonding. The effectiveness of the stabilization was quantitatively assessed using the unconfined compressive strength (UCS) test, which measured the mechanical strength of the treated samples as shown in Fig 1.

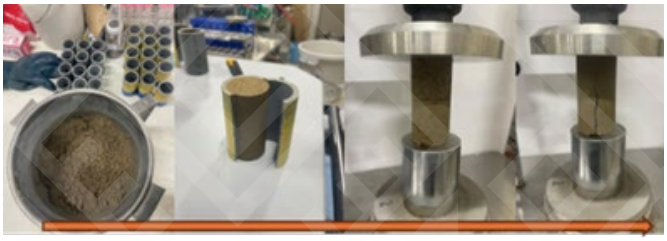


Fig 1: Sample preparation for UCS testing

RESULTS

The results revealed a significant increase in UCS with higher enzyme concentrations, prolonged incubation periods, and favorable temperatures. Key findings include the following:

Effect of temperature

At 30°C, the highest UCS values were observed, reaching up to 1158 kPa for samples with a 1:2 cellulose-to-enzyme ratio after 14 days as presented in Fig 3, Fig 4, and Fig 5 (b).

Samples incubated at 20°C exhibited the lowest strength gains, peaking at approximately 833 kPa. The reduced enzymatic activity at lower temperatures limited biopolymer formation.

At 40°C, UCS value (1044 kPa) was comparatively lower than at 30°C, suggesting enzyme denaturation at elevated temperatures.

Effect of cellulose-to-enzyme ratio

As presented in Fig 2, Fig 3, and Fig 4, the 1:2 cellulose-to-enzyme ratio achieved notably higher strength, highlighting the advantages of increased enzyme concentration in promoting cellulose hydrolysis. The greater enzyme availability likely facilitated a more efficient breakdown of cellulose, leading to enhanced material properties. On the other hand, the 1:1 ratio resulted in moderate strength gains, suggesting that the limited enzyme concentration restricted the hydrolysis process and hindered further strength development. These results emphasize the critical role of enzyme concentration in optimizing cellulose conversion and improving material performance.

Conclusions

This study demonstrates the potential of cellulase-induced bio-cementation as a sustainable soil stabilization technique for Masado sand. Optimal strength gains were observed at 30°C with a 1:2 cellulose-to-enzyme ratio, which enhanced enzyme activity and biopolymer formation, significantly improving the mechanical properties of the treated sand. This technique offers a promising, eco-friendly alternative to traditional stabilization methods, reducing reliance on energy-intensive materials like Portland cement.

Future research should validate bio-cemented soils through field applications, assessing their long-term performance under environmental stressors. Comparing their effectiveness with conventional methods, evaluating economic feasibility, and analyzing environmental impacts are essential. Collaboration across disciplines will aid in developing standardized guidelines for large-scale applications.

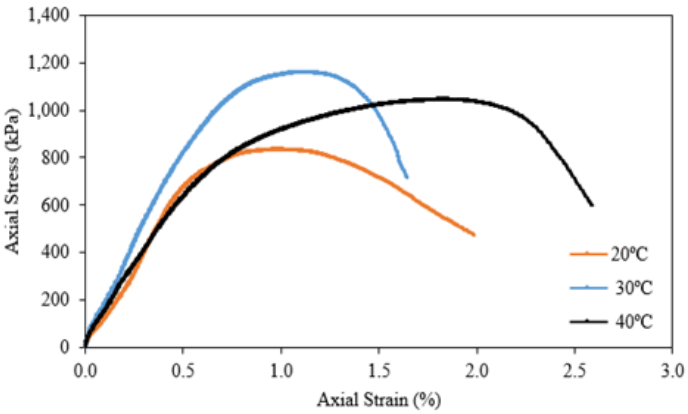


Fig 3: Failure pattern at 1:2 Cellulose-Cellulase ratio after 14 days of curing

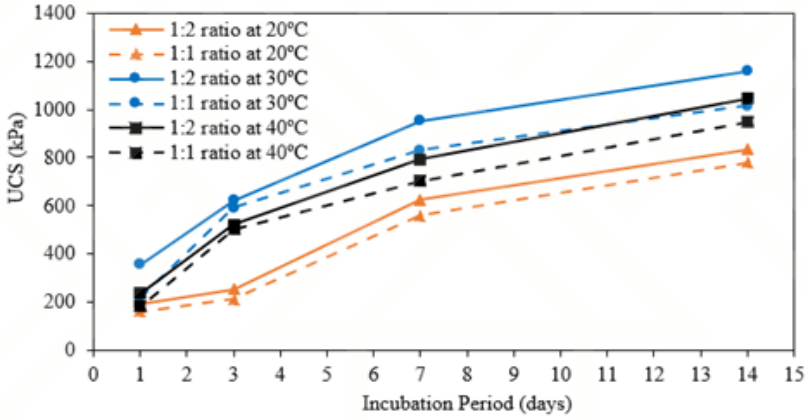


Fig 4: UCS of treated sand at different incubation temperatures and cellulose-to-enzyme ratios.

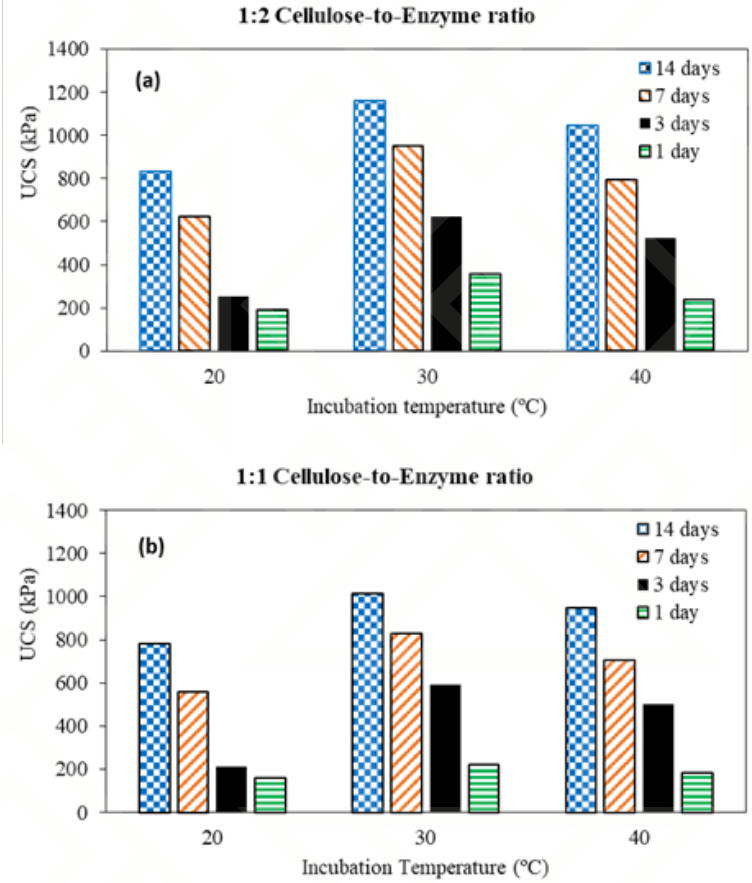


Fig 5: Treated sand UCS variation with temperature

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There is Need for a Comprehensive Flood Mitigation Plan for Our City

ENG. DR.KWERONDA FRANK

Civil Engineer

Urban flooding results from large and often rapid precipitation/rainfall events that overwhelm drainage infrastructure, resulting in flooded streets, parking lots and basements like in the flood events that usually leave many citizens devastated in Kampala and surrounding areas. It seems that lately with the effects of global warming, flood risk has increased and cities are facing on the one hand more frequent hazards.

Flooding events are a significant driver of disaster loss, resulting in insured and uninsured losses, property damage, loss of lives and negative impacts on residents and communities in Kampala and beyond. The risk of flooding in urban environments is affected by watershed characteristics, environmental conditions, and the presence and condition of flood management and mitigation technologies. Most of rainwater reaching the ground surface either infiltrates the soil, some stay on the surface or returns to the air by evaporation and evapotranspiration. Urbanization has sealed natural soils by pavements, roofs, blocked drainage channels and other impervious surfaces (some sealed and blocked by the numerous used polythene bags-kaveera), constraining natural infiltration and evapotranspiration and subsequently converting rainfall into too much runoff.

Runoff from open soils in urbanized areas is also increasing because construction activities have compacted soils to behave like impermeable surfaces. Conventionally, engineered facilities such as gutters, channels, and pipes are built to convey runoff from sealed surfaces to centralized detention ponds, retention facilities, and nearby streams and lakes as quickly as possible. In heavy rainfall, these facilities usually fail to compete with the superimposed peak flows discharging from different sealed surfaces, leading to overflow and flooding.

Across the globe, on-site treatment techniques have been recently applied, either separately or in combination, to retain, detain, infiltrate, harvest, evaporate, transpire, or re-use rainwater on the source and thus to reduce both the urban runoff volume and runoff peak discharge. On-site stormwater treatment approaches are termed as Integrated Urban Water Management, Water Sensitive Urban Design, Sustainable Urban Drainage system after a proper flood simulation and forecast, and other similar terminologies. While the terms are different, their planning and designing principles are similar, with the same goal of restoring pre-development hydrology

by treating and handling rainwater at the source. While some of these approaches may not be purposed primarily to mitigate urban flooding, they have co-benefits of mitigating urban flooding by reducing the runoff volume and decreasing the peak-flow discharge. It must be noted that to forecast and have a better flood management model, good historical hydrological data must be used so that flood forecasting is done and better flood handling structures like dams, drainage channels etc. are well designed to handle any runoff of any given flood return period.

We must also appreciate that factors like poor planning of structures especially in Urban centers, environment degradation such as encroachment on wetlands, cutting of trees, reduced good vegetation cover and continuous use of polythene bags (Kaveera) greatly contribute to intense flooding whenever it rains.

Other techniques such as permeable pavements are suitable only to low-volume light-duty paved areas such as parking lots and pedestrian lanes. Therefore, as urban flooding takes place at heavy rainfall events only, current technologies do little to mitigate urban flooding. To find a solution for urban flooding, we must understand that runoffs from sealed and unsealed surfaces merged together and make the superimposed peak flow overwhelm the carrying capacity of local drains.

Other Sustainable options have to be designed to better mitigate the effects of flooding in urban areas and in a long-term strategy. Some of the techniques are categorized into aboveground ones, including vegetated and non-vegetated roofs or surfaces; ground-surface ones, including permeable pavements, water-retaining pavements, trees, infiltration trenches; and underground ones, including soak ways and other underground water storage units. Water barrels and water tanks are used to harvest rainwater for non-potable uses but they must be frequently emptied by homeowners to continually reset them and prepare them for more incoming rainwater. Vegetated and non-vegetated surfaces, permeable pavements, water-retaining pavements, trees, and infiltration trenches have great ability to retain and detain rainwater in case of a small rain. Clogs of permeable pavements, infiltration trenches, and soakaways degrade their hydrological performance, which can be restored by frequent maintenance.

Kampala City under KCCA can reduce the likelihood and impact of urban flooding by implementing strategies to better manage water on the surface, store excess water, and adapt buildings and infrastructure to better cope with floodwater.
As urban flooding takes place when the overflows from different catchments superimpose to a degree that exceeds the carrying capacity of local sewer pipes, current mainstream techniques are insufficient to mitigate flooding with in Kampala city and beyond. To mitigate urban flooding, in case of a heavy rainfall, the peak flow must be attenuated substantially and the discharge duration must be extended proportionally.

Flood risk management therefore needs champions at the city, regional and national lever in order for it to be brought to the table, as appropriate, in major developmental decision-making processes. Issues with a strong champion in a position of influence tend to be more successfully addressed in general.
Lastly, the relevant authorities have to be tough on issues of poor urban planning, wetland encroachment, tree cutting and also propose an alternative option for polythene bags that have continuously degraded the environment. Better options shall have to be proposed to counter the above.

ENGINEERED SYSTEM FORMWORK:

A STRUCTURAL BACKBONE TO SAFER CONSTRUCTION IN UGANDA

(Case Study: Kampala Flyover Project - Underpass Structure At Villa Park, Nsambya)

Brian Okello Alunyu,	Civil Engineer, Dynaco Limited
Eng. Jonathan Tugume	Civil Engineer, Dynaco Limited

Illustration of a DOKA Slab and Beam Formwork Arrangement (Inset: Illustration of the Underside of a System Formwork Deck)

Collapsing Buildings and Formwork

The collapse of buildings in Uganda continues to dominate news cycles with infamy for tragic losses of life, shattered investments, and questions about the ethics and technical rigor of our built environment. Despite improved awareness in structural design and supervision, one critical component remains under-regulated and poorly understood formwork engineering. This temporary structure and unsung backbone of concrete works often fails silently, but catastrophically.

If concrete had feelings, it would be terrified during casting in Uganda. In Uganda, formwork failures are overwhelmingly linked to the use of non-engineered, traditional timber-based supports. They are typically erected with eucalyptus poles, untreated timber planks, and crude tying methods, rarely subject to structural analysis. Their collapse under the self-weight of fresh concrete is neither surprising nor unpredictable; it is an engineering failure rooted in tradition & culture rather than calculation & design.

This article seeks to demystify system formwork solutions and highlight their role in transforming Uganda's construction safety landscape. We draw lessons from Dynaco's application of DOKA system formwork on the Kampala Flyover Project and other critical infrastructure sites across Uganda.

System Formwork: Kampala Flyover Project

The Kampala Flyover Project, supervised by UNRA and constructed by Shimizu-Konoike (SK-JV), posed unique challenges in the Underpass Box Culvert and Tunnel sections. Dynaco Limited was subcontracted to design, supply, and install system formwork for massive base slabs (up to 1250mm thick), tall retaining walls, and thick top slabs at heights exceeding 9m high.

Design Criteria

Our design process leveraged the DOKA Formwork Engineering Manual, applying Eurocodes and German DIN standards such as EN 12812 (Falsework) and DIN 18218 (Concrete Pressure). We brought in DOKA system formwork "the gold standard" in engineered temporary works. Every component had a name, load capacity, and a technical datasheet. Using the DOKA Formwork Engineering Guide, we computed the concrete pressure profiles, accounted for wind, wet weight, and self-weight. The base slabs had to resist up to 14.87Kpa, the walls up to 52.4Kpa, and the top slabs up to 21.375Kpa. Unlike the usual timber improvisation, this was an orchestra of structural steel, engineered timber, pressure and load capacity calculations, and erection precision.

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At the heart of this success was engineering integrity. We deployed DOKA Frami Panels with a pressure capacity of 40Kpa base slabs and shorter walls, DOKA Top 50 Large Panel System with a pressure capacity of 80Kpa for tall vertical casts, and the superior DOKA D2 Tower system for the Top slabs. Each of these had design and installation drawings, connection details, support calculations, and safety margins. The DOKA D2 tower held up loads of 57.6kN per leg which was more than twice the slab's imposed load. These systems were fabricated, erected, and inspected under strict procedural controls. Site carpenters received hands-on training and supervision, ensuring proper implementation of assembly drawings and static calculations. The results were crystal clear: uniform surface finishes, precise geometrical tolerance, and above all, zero incidents of formwork collapse.

From Flyovers to Bridges and Box Culverts

Beyond the Flyover, Dynaco has implemented DOKA systems in over 14 bridge and box culvert projects across Uganda. The testament to such success can be seen from the ongoing Ssezibwa, Kochi, Osu, Odrua and Apaa bridges; and projects we have completed like Ora, Eraji, Nyara, Ndaiga, Manafa, Kabaale (Ngoma), Biraara bridges, deck repairs to Kazinga channel among others.

Top Slab Formwork Set Up using DOKA D2 Towers (Load Capacity of 57.6KN per Leg)

Aerial View of the Underpass (Mukwano Side)

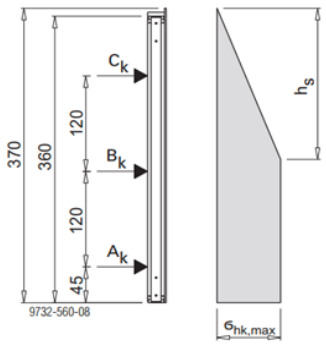
DOKA Top 50 Large Area Formwork System

Finished F3 Surfaces of the Underpass Walls and Top Slabs

Wall Formwork Setup using DOKA Frami Panels

DOKA D2 Tower Formwork Drawing for Top Slabs

Formwork height 3.70 m



Perm. fresh-concrete pressure $\sigma_{hk,max}$ [kN/m²]	30	40	50	60	70	80
Beam centres [cm]	57	44	35	31	26	25
Max. span deflection [mm]	0.3	0.3	0.3	0.3	0.3	0.3
Max. cantilever deflection [mm]	0.2	0.1	0.1	0.2	0.2	0.2
Waling load C_k [kN/m]	25	26	25	25	25	25
Waling load B_k [kN/m]	38	50	59	56	65	64
Waling load A_k [kN/m]	31	41	52	56	73	80

DOKA Top 50 Large Area Formwork Parameters (3.7m)

The Challenge in Uganda's Building Sector

While civil infrastructure projects, Oil & Gas sector have embraced formwork engineering, the building sector lags behind. Site visits across Kampala reveal a grim pattern of congested timber scaffolds, unbraced vertical props, and wet concrete bulging through gaping joints. In several collapsed buildings, forensic engineering has traced the trigger point back to formwork inadequacy.

There is a growing need for; Regulatory enforcement of formwork standards, Professional oversight during formwork setup and striking, Training programs for site carpenters and supervisors and the Promotion of system formwork through public procurement models demanding for engineered formwork systems.

Conclusion and Summary

Engineered formwork is not a luxury. It is a structural necessity—a first line of defence against building collapses and construction fatalities. As we modernize our infrastructure, let us equally modernize the temporary structures that shape it. From the Kampala Flyover to the furthest district box culvert, system formwork has proved its worth. The future of safe, efficient, and quality concrete structures in Uganda rests on it.

In summary, let's stop pouring concrete into assumptions. Uganda must transition to engineered temporary works because in truth, engineered formwork doesn't cost more; it saves lives, time, and concrete. If we can't calculate what supports our concrete, then we're not building. We're gambling.

NEWLY REGISTERED ERB ENGINEERS

NEWLY ENROLLED UIPE MEMBERS

NB: To acess the newly registered engineers and enrolled UIPE members scan the QR codes

UIPE AND ERB FEES STRUCTURE

UIPE MEMBERSHIP

(A) JOINING UIPE MEMBERSHIP

Membership Category	Membership fees
Corporate	UGX 750,000
Graduate	UGX 350,000
Technologist	UGX 350,000
Technician	UGX 250,000
Student member	UGX 20,000

Membership Category	Membership fees
Corporate	250,000
Graduate	200,000
Technologist	200,000
Technician	150,000

COSTS OF TRAINING COURSES

CPD - Member	
Physical	Virtual
250,000 per day	125,000 per day
CPD - Non - Member	
350,000 per day	150,000 per day
IPD - Member	
175,000 per day	85,000 per day
IPD - Non - Member	
250,000 per day	125,000 per day

ERB REGISTRATION

(B) PERMANENT REGISTRATION – UIPE Corporate Members Under JAC and East African Direct Applicants

Application Fee	Shs. 400,000
Registration Fee – Total – UGX. 1,040,000	
Registration	UGX. 90,000
Certificate	UGX. 50,000
Annual Subscription	UGX. 350,000
Stamp	UGX. 200,000
Annual Licence	UGX. 250,000
Shirt and Lapel Pin	UGX. 100,000

(C) TEMPORARY REGISTRATION - For Non-East African Engineers

Application Fee	Shs. 400,000
Registration Fee	USD. $800

(C) PERMANENT REGISTRATION – TECHNICIANS & TECHNOLOGISTS East African Direct Applicants Diploma Holders

(i) TECHNICIANS – Total UGX 600,000	
Application Fee	UGX. 100,000
Registration Fee	UGX. 200,000
Triennial Fees & Practicing Licence (for 3 Years)	UGX. 300,000
Shirt and Lapel Pin	UGX. 100,000

(ii) TECHNOLOGISTS – Total UGX 750,000	
Application Fee	UGX. 200,000
Registration Fee	UGX. 350,000
Triennial Fees & Practicing Licence (for 3 Years)	UGX. 100,000
Shirt and Lapel Pin	UGX. 100,000

RENEWALS

Permanent Registered Engineers	
Annual Fees	UGX. 600,000
Temporary Registered Engineers	
Annual Fees and Licence	USD. $400
Annual Stamp Renewal	USD. $65
New Stamp	USD. $120
Registered Technicians & Technologists	
Registered Technicians & Technologists	
Technicians	UGX. 300,000
Technologists	UGX. 450,000
OTHERS	
ERB Shirt	UGX. 80,000
ERB Lapel Pin	UGX. 20,000
Engineers Stamp - Replacement	UGX. 200,000

CONNECT WITH US

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