



**THE MAGIC
OF MODULAR
CONSTRUCTION**

3D Printing Technology *for* Construction

**TECHNOLOGY HAS EMERGED AS A PROMISING
SOLUTION TO MANY OF THE INDUSTRY'S CHALLENGES.**



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TOUGH EQUIPMENT.**



FROM THE EDITOR

“ 3D printing tech to change how we design, build

Innovative technologies continue to redefine the way we design, build, and live in structures. Among these technologies, 3D construction printing stands out as a game-changer with the potential to revolutionise the industry.

This technology, which uses automated machines to create three-dimensional objects by layering materials like concrete or polymers, has made strides in recent years, and its impact on the construction sector cannot be overstated.

One of the most compelling aspects of 3D construction printing is its potential to significantly reduce construction time and costs.

Traditional construction methods often involve intricate and labour-intensive processes, leading to extended project durations and budget overruns.

3D printing can streamline the construction process by creating complex structures in a fraction of the time. The result is not only faster project completion but also a more cost-effective approach to building.

Furthermore, the technology promotes sustainability in the industry. With precise material placement and minimal waste, it minimizes the environmental impact.

Additionally, 3D construction printing allows for intricate designs that were previously unattainable through traditional methods. This newfound design freedom

paves the way for remarkable architectural innovations and pushes the limits of what can be achieved in terms of form and function.

As the technology continues to evolve, we can expect to see an expansion of materials that can be used for 3D printing, enhanced precision in the process, and improved software for design and execution.

However, it is essential to acknowledge that while 3D construction printing offers immense potential, it also comes with challenges.

Regulatory, safety, and quality control issues must be addressed to ensure the safe and reliable implementation of this technology.

In this edition of our magazine, we explore the transformative power of 3D construction printing, featuring the latest developments in this field.

We hope this publication will inspire readers and stakeholders in the construction industry to embrace this technology and harness its potential for a more efficient, sustainable, and innovative future in construction.

As always, we encourage your feedback. Join us on this journey of exploration as we continue to navigate the ever-evolving world of construction.

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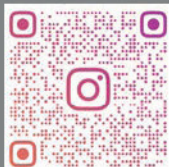
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Work for JKIA new terminal to kick off in January

Jomo Kenyatta International Airport (JKIA) is getting a new terminal - with a groundbreaking set for January next year amid a steady rise in air traffic.

The Kenya Airports Authority chairman, Caleb Kositany said on Oct. 3 that the government was preparing to float a tender for the terminal that is expected to increase the capacity of the country's largest airport.

JKIA, with a capacity of two million passengers annually, serves about nine million, and the number is expected to rise in the coming years.

HARD TIMES

Building costs up 2.7% as material prices soar

Kenya and European Commission (EC) have signed a Sh47 billion deal for construction of East Africa's first bus rapid transit (BRT) for electric buses.

The deal that was signed a few weeks ago in Belgium will unlock funds for construction of Nairobi Core Bus Rapid Transit Line 3 (BRT 3), which will be used by zero emission electric buses as part of

Kenya's climate change mitigation plan.

The facility is expected to introduce intelligent transport system, affordable fare setting, inclusion of access to the public transport system for youth, women and low-income households, and innovative concepts to address commuter safety.

"By supporting the implementation of a safe, clean, high quality and

efficient public transport system in Nairobi, Team Europe is the key partner in Kenya's green transition," the EC said.

Under the agreement, the European Union (EU) will provide Sh6.1 billion in grants, while the European Investment Bank (EIB) and the French Development Agency AFD will provide Sh32.1 billion.

Kenya is expected to contribute Sh9 billion.



Workers at a construction site. PHOTO | FILE

REAL ESTATE

Superior Homes eyes listing on Nairobi bourse by 2027

Real estate developer Superior Homes Limited intends to list on the Nairobi Securities Exchange by 2027 as it seeks to provide people with the opportunity to invest in the company and participate in its growth.

According to chief executive Shiv Arora, listing on the Nairobi bourse has

been one of the long-term goals for the company behind the GreenPark Estate in Athi River - a 163-acre development comprising a total of 750 units and a shopping centre.

"It has always been our dream, and we believe we can offer a superb, attractive development for people to invest in us

at the NSE and change the narrative around listed real estate firms. We are pushing for that," he said.

Superior Homes, which is putting the final touches on GreenPark Estate, is also the company behind the proposed Lukenya Wildlife Estate, Pazuri at Vipingo, and Lake Elementaita Lodge.

SCANDAL

Big 9 steel firms challenge Sh338m 'price fixing' fine

The firms have tendered their individual appeals before the Competition Tribunal.

Nine steel companies that were recently fined a combined Sh338 million by the Competition Authority of Kenya (CAK) for colluding on steel prices have individually moved to the Competition Tribunal, seeking to quash the penalty.

Nail and Steel Products, Brollo Kenya, Blue Nile Wire Products, Tononoka Rolling Mills, Devki Steel Mills, Doshi & Hardware, Corrugated Steel, Jumbo Steel Mills, and Accurate

Steel Mills were found guilty of engaging in price fixing by collectively setting prices and price adjustment timelines.

Further, the companies, except Accurate Steel Mills, were penalised for output restrictions by agreeing to limit imports of certain steel components, thereby causing an artificial shortage that raised prices.

According to the CAK acting director-general Adano Wario, the compa-



Steel prices have soared in recent months. PHOTO | FILE

nies had, by mid-October, tendered their individual appeals before the tribunal as they sought to have the penalties set aside.

“With regard to the steel sector, the nine manufacturers appealed the authority’s decision to the Competition Tribunal. Given that it is now a quasi-judicial matter, we cannot comment further on the specifics,” Dr Wario said on October 23.

Price-fixing is an anti-competitive agreement between two competing sellers to maintain prices at a certain level by controlling supply and demand.

Section 31 of the Competition Act forbids companies from conspiring to control product prices, setting minimum charges, and determining when and to whom to offer discounts — practices that hurt consumers and competitors.

INVESTMENT

IHS acquires 200 homes at Garden City

South African property investor International Housing Solutions (IHS) has acquired 200 units in Mi Vida Homes’ affordable housing project in Nairobi, providing a substantial financial boost to the real estate developer.

IHS, which specialises in green affordable housing investments, has acquired the units at 237 Garden City on Thika Road through its local subsidiary, IHS Kenya, aiming to capitalize on the local housing market.



A road construction project. PHOTO | FILE

As per the deal, IHS will acquire 100 one-bedroom apartments, each priced at Sh4.2 million, and 100 two-bedroom units, each priced at Sh6.4 million.

Mi Vida’s 237 Garden City is in its groundbreaking stage, and the block purchase represents 30% of the total 600 apartments on offer.

IHS Kenya managing director Peter Mayavi said that the deal will guarantee Mi Vida Homes a ready market for its units.

“IHS’s agreement with Mi Vida Homes is timely because Kenya has a pressing need for housing that is not only affordable but offers the quality that ensures users get a dignified

living,” Mr. Mayavi said.

In agreement, Mi Vida Homes chief executive Samuel Kariuki said the purchase deal, at a fixed price, has enabled the developer to mitigate market risk, which is a challenge to scaling for the wider housing market.

“Through this partnership with IHS, Mi Vida Homes has a guaranteed market for the apartments we are building. Our main goal is to guarantee timely delivery and sustainability,” Mr. Kariuki said.

EVENTS DIARY

The Big 5 Construct Kenya

Nov. 8-10, 2023
Nairobi, Kenya
www.thebig5constructkenya.com

The Big 5 Global

Dec. 4-7, 2023
Dubai World Trade Centre, Dubai
www.big5global.com

BuildExpo Kenya

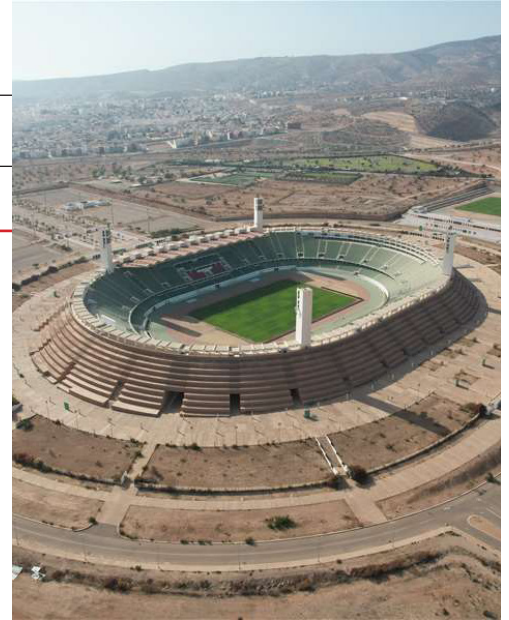
June 4-7, 2024
Nairobi, Kenya
www.expogr.com

BuildExpo Africa

Sept 25-27, 2024
Dar es Salaam, Tanzania
www.expogr.com

MOROCCO

Morocco to build World Cup Stadium



The stadium in Benslimane, near Casablanca, is expected to be completed by 2028 for a total cost of \$500 million.

Morocco is scheduled to build a large stadium in Benslimane, near Casablanca, and upgrade six others in preparation for co-hosting the 2030 World Cup, according to a report by the news agency Reuters.

A deal was signed the same day between the government and state-owned fund CDG to finance the new stadium to be ready by 2028 for a total cost of \$500 million, the prime minister's office said in a statement.

The refurbishments are estimated to cost a total of \$1.4 billion between now and 2028. The six stadiums, to be renovated to host the African Cup of Nations

in 2025 and the 2030 World Cup, are in the cities of Agadir, Casablanca, Fez, Marrakech, Rabat and Tangier, the report said.

According to a similar report by Morocco World News, the funding seeks to ensure that the stadiums meet the standards that the Confederation of African Football (CAF) has set for the 2025 AFCON, as well as the requirements FIFA has set for the 2030 World Cup.

FMRP's President Fouzi Lekjaa said that stadium renovation work has already started and "will progress at a pace that guarantees the successful organization of both tournaments".

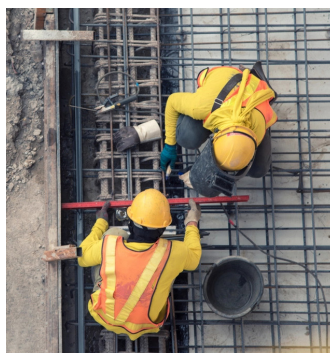
NIGERIA

Chinese eye \$6bn projects in Nigeria

Nigeria's science and infrastructure agency has reached non-binding agreements with several Chinese firms covering projects worth a combined \$6 billion.

The National Agency for Science and Engineering Infrastructure (Naseni) said it concluded three memoranda of understanding and 10 letters of intent during the Third Belt and Road Initiative Forum in Beijing in mid-October.

Naseni's memoranda detailed projects worth



Construction workers. PHOTO | FILE

\$2 billion, including an electric vehicle factory by Shanghai Launch Automotive, a drone plant by the China Great Wall Industry

Corporation, and a technology transfer deal with Newway Power Technology covering electric vehicles.

The letters of intent expressed Chinese firms' interest in partnering with the agency to develop solar energy, natural gas, micro-grids, EVs and drones.

Other deals covered training and technology transfer, and there was an agreement to develop an industrial park, although Naseni did not say where.

Companies that sub-

mitted letters of intent included solar specialist TBEA, carmaker DongFeng Vehicles, LNG company HiLong Energy, contractor China State Construction Engineering, and natural gas provider CIMC.

Acadia Technologies seeks to develop smart grids, while Space Star Technology and ENRIC will provide drones and clean energy, respectively.

If approved, the industrial park will be developed by Hidier Power Group from Beijing, China.

SOUTH KOREA

Korean techies unveil advanced scan to BIM tech

Solution useful in 3D geospatial information modeling, including digital twin modelling.

The Korea Institute of Civil Engineering and Building Technology (KICT) has introduced a scan to BIM-based reverse engineering technology, a groundbreaking invention poised to reshape the construction industry's future.

The scan to BIM technology finds application in 3D geospatial information modeling, including digital twin modelling. It also offers a solution to

the challenges of errors during the conversion of 3D scan data into BIM or shape models, which often required costly software.

Dr. Kang Tae-wook, in collaboration with an international research consortium, engineered a tailored solution harnessing the prowess of 3D vision, deep learning, and advanced data processing technologies.

This team comprised researchers from top



institutions, including the University of North Florida, Purdue University, and the State University of New York.

The discovery was made during a research project titled, '3D vision & AI based Indoor object Scan to BIM pipeline for building facility management'.

This technology automatically segments

objects from 3D point cloud data, extracts shape information, and generates BIM objects, reducing modelling time and rework for digital twins.

According to the KICT researchers, the technology can lead to a 23.7 times improvement in productivity and a 110.21% increase in modelling information.

AUSTRALIA

Hadrian X upgraded for US market

Australian construction robotics company FBR has initiated testing of the latest model of its groundbreaking Hadrian X bricklaying robot, enhanced with upgrades tailored to U.S. market standards.

The device has transformed into a three-axle truck featuring a 32-meter-long articulated telescopic arm capable of laying up to 300 masonry blocks per hour.

Among the improvements are a block-shuttling system and the use of a "special construction



Hadrian X bricklaying robot. PHOTO | COURTESY

adhesive" to enhance the strength of the finished product.

The laying arm follows a CAD plan, and operators

add pallets of brick to the truck, where other robots unpack them and, if required, trim them to size with a circular saw.

They are then passed down the boom arm, "buttered" with the glue, and laid in place. FBR says the arm is long enough to build a three-storey structure.

The largest blocks the tablet-controlled system can handle are 600mm by 400mm by 300mm. This is a US standard and reflects FBR's targeting of the US market.

A third next-generation Hadrian X has reportedly commenced production, and procurement for a fourth, fifth and sixth next-generation Hadrian X is well under way.



Is 3D printing the magic wand for construction?

Three-dimensional (3D) printing is increasingly becoming popular in the global construction market, thanks to its potential to change the way we design, build, and maintain structures, from houses to skyscrapers.

The technology, which involves the creation of 3D objects from a digital file using a special printer, is being used in many parts of the world to create large-scale objects such as walls, floors, and even entire buildings.

In Dubai, for example, 25% of state buildings will be 3D printed by 2025, while China, Italy, and the Netherlands are all vying to print the world's longest bridge.

Meanwhile, American

builder Icon is currently racing to complete the world's largest 3D-printing housing project, a 100-home estate in Georgetown, Texas.

Closer home in Africa, Holcim's subsidiary 14 Trees recently 3D printed 10 houses in Kilifi, Kenya, as work continues on the continent's largest 3D construction site.

Gated community

The 10 houses, which were printed in 10 weeks – averaging one house per week – are part of 52 houses that are set to be printed at the Kilifi gated community.

14Trees, a joint venture between Holcim and CDC Group, began work on site last October, months after delivering Kenya's first 3D

printed house in Athi River.

In February, the company said it had 3D printed six 3-bedroom (76 sq m) houses and four 2-bedroom (56 sq m) houses using a single BOD2 printer from COBOD.

COBOD is a world leader in 3D construction printing solutions while BOD2 is the world's best-selling construction 3D printer with 65+ printers sold worldwide.

"From Oct. 2022 to Jan. 2023, 14Trees 3D printed 10 houses in Kilifi, Kenya, averaging one house per week," the company said in a press statement.

One of the most significant benefits of 3D printing in construction is speed. Building a large-scale object using traditional methods can take



3D printing technology has been used to print entire buildings in a matter of days.

► months or even years, but with 3D printing a building can be constructed in a matter of days.

This can greatly reduce the construction time, which is especially important when there is a shortage of housing or a need for emergency shelter.

Another benefit of 3D printing in construction is cost savings.

Traditional construction methods require a significant amount of materials and labour, which can be expensive. 3D printing, on the other hand, can use less material and requires less labor, which can save on costs.

Cost efficiency

“With 3D printing, you can solve two problems at once. You can build faster like we have shown here with our 10 houses in 10 weeks,” 14Trees managing director Francois Perrot said. “At the same time, we can achieve better cost efficiency.”

14Trees is now moving into the next phases of the project, which consists of 10-15 houses each - with build costs 20% lower than standard houses.

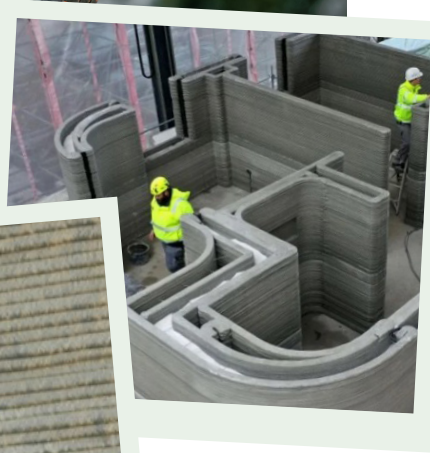
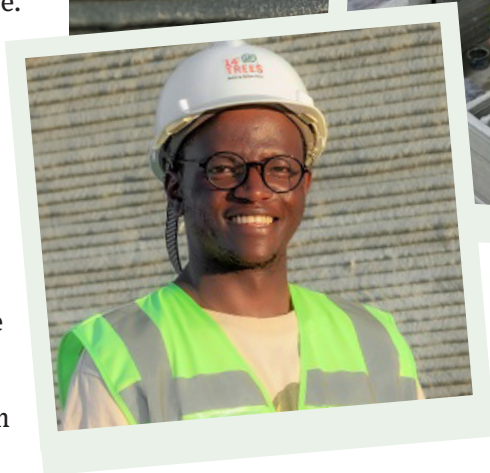
“Using Holcim’s proprietary 3D printing materials, TectorPrint, made at a local plant, has already meant a significant reduction in costs,” Perrot added.

Complex designs

In addition to the above benefits, 3D printing can help to create complex designs that would be difficult or impossible to build using traditional methods.

3D printing technology also offers a wide range of exciting applications. One of these applications is the ability to print houses on-site.

“This technology has been used to print houses in a mat-



ter of days. This could greatly benefit those who are in need of affordable housing,” says John Mwangi, a professor at the University of Nairobi.

“Additionally, 3D printing can reduce waste as it only uses the necessary amount of materials needed to print the structure.”

Another potential application of 3D printing in construction is the ability to print parts of a building off-site and then assemble them on-site.

This method can be useful for creating large-scale structures such as bridges and tunnels. Printing parts of

a structure off-site can save time and reduce the need for heavy machinery on-site.

In addition to creating structures, 3D printing can also be used to create customized parts for construction projects.

For example, 3D printing can be used to create molds for concrete, which can be used to create unique shapes and designs.

Additionally, 3D printing can create intricate details on a structure that would be difficult to achieve using traditional methods.

Despite the potential benefits of 3D printing in construction, there are still some challenges that need to be addressed.

One of the challenges is the lack of regulation and standards for 3D printing in construction. Additionally, there is a need for more research on the long-term durability of 3D printed structures.

Another challenge facing the technology is the high cost of printers, which makes many construction firms delay making investments in the sector until the costs become more manageable.

Waste reduction

That being said, 3D printing has the potential to make a mark on construction.

The ability to print large-scale objects quickly and at a lower cost could revolutionize the way we build structures.

The potential for customization and the ability to reduce waste could also make 3D printing an attractive option for investors.

While there are still challenges that need to be addressed, the future of 3D printing in construction looks promising. ■

Top: A giant printer at work on Mvule Gardens, Kilifi. PHOTO | 14 TREES

Inset: A happy construction worker at Mvule Gardens, Kilifi. PHOTO | 14 TREES

Elecosoft eyes site managers with new tool

Company launches Powerproject Collaboration Cloud to run smart, profitable construction businesses.



To help companies deliver more projects on schedule, within budget and stress-free, Elecosoft has launched Powerproject Collaboration Cloud – a collection of market-leading software in one monthly subscription.

Powerproject Collaboration Cloud empowers construction companies to plan, track and manage projects in one place, collaborating closely with team members to deliver strong results.

As users are connected via the cloud, everyone involved can share information anytime, anywhere – in the office or on site.

And Powerproject

Collaboration Cloud also provides the necessary business intelligence capabilities your company needs to make smart decisions and report on success.

What does it include?

Companies that subscribe to Powerproject Collaboration Cloud will gain access to three Elecosoft solutions, integrated into one package:

1. Powerproject:

Award-winning planning software developed specifically for the construction industry. With Powerproject, you can build schedules online in minutes, assign tasks and resources to team members, manage workflows, update delivery timelines as projects progress and track costs as you go.

2. Site Progress Mobile:

With our construction management mobile app, your company can connect easily with onsite teams to share schedules, update progress and improve data



accuracy. Instant communication also means that challenges and setbacks can be solved quickly, to keep projects running on time and within budget.

3. Powerproject Vision:

For one point of truth at all times, your company can store data in the cloud via Powerproject Vision, for complete transparency, integrity and control over every construction project.

Connect teams to the latest updates and track revision history, to keep everyone on the same page and make strategic decisions.

Powerproject Collaboration Cloud delivers all the benefits of Elecosoft's flagship Powerproject software and more. If you're already using Powerproject or another piece of Elecosoft technology, you can easily

upgrade to Powerproject Collaboration Cloud for the complete collection.

Who is it for?

Whether you have three construction planners or 20, Powerproject Collaboration Cloud is an efficient way to streamline your project operations and foster close communication between colleagues and contractors.

It's particularly useful for SMEs and scale-ups, as it gives access to features and benefits typically only available to larger enterprises.

How can I access it?

One of the benefits of Powerproject Collaboration Cloud is its simplicity. You get three pieces of software for a monthly subscription. It's cost-effective and easier to manage than buying everything separately.

For more information, visit <https://elecosoft.com/collaboration>
You can contact the Elecosoft team on phone - 01844 261700
or by sending an email to: powerproject@elecosoft.com

Elecosoft[®]

Augmented Reality helps builders to see through walls

Magical helmets allow builders to take BIM models to the site, wear them on their heads, and experience them as an immersive, full-scale 3D environment.



AR is changing how society interacts with information in context to the environment.

Imagine you are part of a crew constructing a new office building: Midway through the process, you're onsite, inspecting the installation of HVAC systems.

You put on a funny-looking construction helmet and step out of the service elevator. As you look up, there's a drop ceiling being installed, but you want to know what's going on behind it.

Through the visor on your helmet, you pull up the Building Information Model (BIM), which is instantly pro-

jected across your field of vision.

There are heating ducts, water pipes, and electrical boxes, moving and shifting with your point of view as you walk along the corridors.

Peel back layers of the model to see the building's steel structure, insulation, and material finishes.

It's like having comic book-style X-ray vision—and soon, it could be a reality on a construction site near you.

This magic hat, the DAQRI Smart Helmet, is a wearable augmented-reality system being developed for use in industrial fabrication industries—especially the building and construction industry.

Essentially, it allows builders, engineers, and designers to take their BIM model to the construction site, wear it on their heads, and experience it as an immersive, full-scale 3D environment.

Giving construction crews access ►





A construction worker views a site with an AR device. PHOTO | FILE

► to this level of multilayered building information would let them effectively see through walls and detect MEP clashes earlier; and in general, allow faster, more informed decisions with fewer errors.

“It empowers you to make decisions in the field, as opposed to waiting till the end of your shift to check with your supervisor,” says Roy Ashok, DAQRI’s chief officer.

The augmented-reality helmets (which cost \$15,000 each) are just starting to trickle onto construction sites as DAQRI begins short trial runs, including a collaboration with Mortenson Construction and Autodesk.

As part of a proof-of-concept test, Mortenson used the magical helmets during construction of the Hennepin County Medical Center in Minneapolis.

“The BIM model is step one,” says Mortenson’s Senior Director of Project Solutions Ricardo Khan.

“The reality is that the value of the model is probably 25% of the real value. The next 75% is connecting the field teams to the rest of the contractual project information in the space.”

The track record for AR wearables is marred by one notorious flop—but unlike Google Glass, DAQRI is focused squarely on industrial applications.

Privacy concerns

In this arena, slightly goofy headwear like augmented-reality helmets is readily accepted, and fewer privacy concerns apply.

In terms of hardware, the AR helmets have three different types of cameras that work together to locate users at a specific point in space and interpret the geometry around them.

There’s a 166-degree, wide-angle grayscale lens that defines the user’s position in an environment, accurate to one centimeter.

Then there’s a depth-sens-

ing camera (the Intel RealSense) that deciphers the geometry of the space and the objects within it, telling you, “This is a door, this is a window, this is a table,” Ashok says.

This awareness allows you to place virtual content and alter a model. It also remembers a “map” of each room that’s created.

“It’s almost like a cartography function,” Ashok says. A third, thermal, camera also allows users to map temperature readings onto objects rendered in 3D.

“With the combination of where you are with the visual odometry system and what is around you, you know almost everything you need to know about the world,” he says.

The DAQRI helmet’s software design was driven by functional concerns for the unique and dangerous environment of a building zone.

An initial idea was to use hand signals, which would be picked up by the helmet’s



Augmented reality helmets (which cost \$15,000 each) are starting to trickle onto building sites.

▶ camera, to wade through its menus—but that didn't work.

"There are two big reasons," Ashok says. "One is reliability. The technology is just not mature enough to have 99.99% reliability, and because of that, it leads to fatigue."

A construction site is also a terrible place to be wildly flapping your arms to highlight an array of lighting fixtures that have not been built yet: Hence the second concern about using hand signals.

Physical surroundings

Due to the showers of sparks, spinning blades, exposed wiring, and tons of metal swinging through the air on construction sites, you want everyone's full attention on the task at hand and the actual physical surroundings.



A software engineer. PHOTO | FILE

"Once you pull your awareness away from what is happening around you, it exposes the construction crew to potential hazards on the job," Khan says.

To address these concerns, the DAQRI team decided the helmets would have to operate completely hands-free, and the engineers settled on what they call a "gaze and dwell system."

A reticule oriented in your field of vision moves as you move your head, "just like a mouse and cursor," Ashok says.

If you hover over a menu item, hyperlink, or model layer for a few seconds, it's selected.

The helmets come with Autodesk BIM 360 out of the box, but it's mostly up to each company to create its own custom software (which DAQRI supports), because the product's range of uses is so broad.

Using DAQRI helmets during a project's construction phase seems like the most intuitive application, but Ashok says it's worth bringing to a building site on "day one of design" as well.

An architect could show his model to engineers and builders on-site before construction begins, and they can point out potential issues—when mistakes are far easier and cheaper to fix.

The system's clear visual interface means it could also provide construction crews with step-by-step instructions for punch-list inspections or even for maintenance after construction is complete.

"AR has far-reaching impacts on how society will interact with information in context to the environment," Khan says.

"For the construction industry, we see it as a needed disrupter to resolve a wide range of business problems, such as increasing safety awareness for the field crew related to just-in-time knowledge.

Static virtual model

As a downstream value, our customers can leverage AR to improve operating and maintaining their facility."

The current incarnation of DAQRI promises to change the way buildings are made, but it still relies on importing a static virtual model of a building and overlaying it with the real thing.

The next frontier will be creating a device that can detect components hidden from view and then represent them dynamically to users—whether they are included in the model or not.

That would bring augmented reality to the cusp of X-ray vision, and the construction industry into a world of in-the-moment material omniscience. ■

Big changes underway in construction

The construction industry is changing quickly, with technology and enhanced inter-connectivity already making a huge impact in this sector of the economy.

From Building Information Modelling to Virtual Reality and 3D printing of buildings, technology is transforming the industry and builders have no choice but to keep up with new technologies around them.

Innovations have, for example, enabled linking of BIM models to devices in the field where real-time sharing of documents helps to enhance productivity.

It is also now possible for colleagues working on site to have concurrent access to a project BIM model.

Virtual reality (VR) and augmented reality (AR) are enabling prospective buyers to digitally tour pre-development or ready houses from anywhere in the world.

In the traditional real estate market, it is impossible for a property buyer to visualize a home for sale – no matter how colourful the brochure, unless they see the product.

This causes longer sale-times while reducing the ability to pre-sell houses.

With VR and AR, prospective customers are able to see what the end product will be like, adding a level of palpability that increases the chances of making sales.

Since 2004 when Professor Behrokh Khoshnevis of the University of South Carolina tried to deliver the first 3D printed wall, innovations in 3D printing have grown exponentially and it is now possible to create a house in just 20 hours.

Indeed, Kenya's first 3D gated community is coming up in Kilifi using the technology that extrudes concrete and other materials to create a 3D model.

Global construction firms are realising the potential of this technology, with the concrete 3D printing market expected to hit \$329 million in 2025.



Punish builders who clog drainage



By Hellen Wangeci

Following the weatherman's prediction of heavy rains, Nairobi residents are staring at yet

another period of flooding attributed to clogged and poorly prepared drainage systems.

Although these issues can be blamed on systems that were put in place many years ago without taking into account the city's future growth, some unscrupulous developers have aggravated the situation by building on sewer lines – obstructing all rain water runs of estates.

This means that the surface runoff has nowhere to go leading to, at times, deadly flash floods right inside the capital city of Kenya.

It is frustrating and unacceptable that as city residents struggle with flooded estates, they also have to grapple with dry taps due to acute water shortage across the capital.

Besides, the encroachment and blockage of waterways by developers makes storm water harvesting difficult yet the water can be purified for domestic use.

The Nairobi County must quickly liaise with the National Construction Authority and other relevant authorities to stop the illegal approval of buildings on sewer lines and demolish the already existing ones.

Those found to have deliberately contravened the law should be punished to serve as a painful lesson to other potential offenders.

People should also refrain from throwing garbage anyhow as this also clogs the drainage systems.

Let us not wait until a disaster happens so as to take action.

Ms. Wangeci is a resident of Kasarani Constituency in Nairobi County.

Key lessons from Athi River demolitions

By John Maxwell

The recent demolitions in Athi River have raised important concerns about the need to avoid normalizing brutal evictions that contradict Kenya's own laws.

These events have not only resulted in loss but have also inflicted trauma on those affected.

To prevent such occurrences in the future and minimize their adverse consequences, we can draw valuable lessons from this incident.

One significant aspect that requires attention is the role of the Judiciary and its processes. The protracted court case related to the East African Portland Cement property contributed to the delay in addressing the issue.

The legal battle may have emboldened unauthorized occupiers and ensnared unsuspecting buyers. If the court case had been resolved more expeditiously, it would have prevented many from becoming embroiled in the situation, reducing the magnitude of loss.

Unauthorized occupiers often take advantage of these delays to further their interests, making strategic land invasions appear lucrative. The lesson here is that the legal process should be efficient and streamlined to prevent the misuse of delays by unauthorized occupants.

Another crucial lesson pertains to landowners. While Kenyan laws do not mandate landowners to occupy their properties, the absence of visible human activity on a piece



of land can make it an attractive target for unauthorized occupiers. On the other hand, regular development, occupation, or cultivation of land acts as a deterrent. Therefore, landowners, whether individuals or institutions, should consider actively monitoring their properties through measures such as fencing, cultivation, commercial or residential use to deter encroachment. Preventing trespassers is more practical and cost-effective than evicting them.

Prospective land buyers also need to be cautious and conduct due diligence before making a purchase. Herd behaviour, where individuals follow the investment choices of friends or colleagues, can be imprudent and does not guarantee protection against fraud.

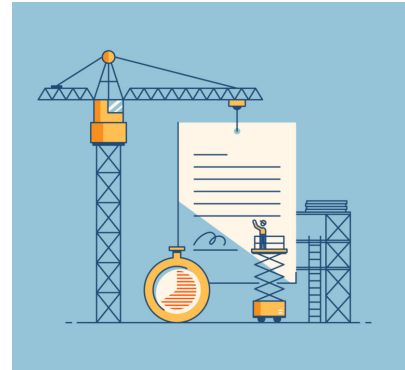
To safeguard their interests, buyers should seek the assistance of credible and licensed professionals, including surveyors, valuers, real estate agents, and lawyers.

Verification of their registration status is crucial, as the market is rife with individuals pretending to be professionals.

Additionally, having a comprehensive written agreement is essential to protect both parties in case the deal goes sour.

Ms. Were is a Nairobi-based development economist and newspaper columnist.

Builders must brace for AI and robot revolution



Artificial Intelligence can help us to better predict outcomes, and to design complex projects.

The idea that Artificial Intelligence and robots will take our jobs and eventually conquer the world makes for a great blockbuster, but this fear of AI-robot overlords is grossly exaggerated.

Robots won't replace our talented construction craft. Instead, a new generation of robots will strengthen our builders by performing highly repetitive, monotonous, hazardous, and less-productive tasks.

In the same sense, AI - which performs decision-making tasks traditionally reserved for humans - won't render our knowledge workers irrelevant.

AI will allow us to better predict outcomes, design complex projects, and automate day-to-day decision-making tasks.

The AEC industry operates in a sea of risk. The usual suspects like unfavourable weather, material and labour shortages, design challenges, or extremities such as regional strife are not uncommon.

Indeed, no matter how detailed the construction plan or thorough the risk register, something unforeseen and highly impactful is always likely to happen.

Due to these uncertainties, it is rare to find projects similar enough to establish meaningful, structured correlations.

There is one Hoover Dam, one Ivanpah Solar Field, one Corpus Christi LNG Program, one Jubail Industrial City, one Chunnel - the list goes on.

Predicting future outcomes due to unpredictable events is a complex task.

This is where AI can assist by helping us gain insight from hidden correlations.

Exposing the relationships found in disparate and unstructured data sets will

produce more efficient and optimized schedules.

Using current practices and technology, only a handful of schedule permutations can be fully evaluated.

Manually scripting sequences is time consuming and often limited by the knowledge of the individual planner.

However, in the future, a planning process employing AI will allow our planners to quickly create and evaluate millions of scenarios, even for schedules with thousands of activities.

Possessing this array of scenarios, a project team can select the sequence to best optimize project outcomes for owners and operators.

Prediction capabilities

By first reviewing a company's disparate project data from the last 10 years, an AI-powered assistant will gain a refined understanding of schedule correlations, as well as improve its prediction capabilities.

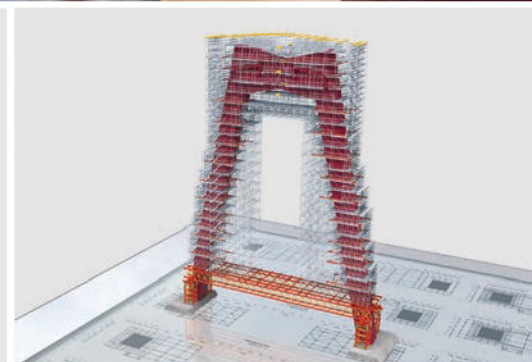
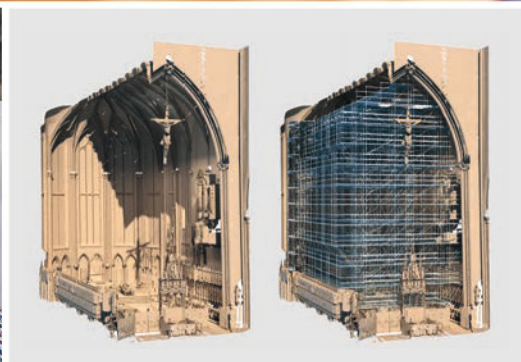
And 10 years is only the beginning, eventually we will be able to train AI to interpret our 120 years of historic data.

Indeed, it's time we put AI and robotic solutions to work and free our designers, buyers, and builders to tackle new challenges.

With trillions of dollars of infrastructure spending needed to keep pace with growth, we need to leverage every available technology to build the world.

We must work to transform the world through applied experience, technology, and innovation to enhance value for our customers, teams, and the public. ■

Send your feedback and comments to: editor@constructionkenya.com



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How to build with 30% less material, time

Precast technology makes it possible to manage mega housing projects with highly competitive costs and schedules.

Most developing cities are struggling to keep up with the rising demand for good quality housing.

Typical demands set for builders in rapidly expanding cities are manifold: - cost pressure (need for affordable housing); pressure to use local raw materials; constant, controlled quality; and safety at work sites.

Traditional construction methods no longer provide a reliable solution to meet the needs. The solution is prefabrication.

With prefabrication, it is possible to build an apartment building, city block or entire neighbourhood in a third of the time needed with traditional methods.

Concrete facades

You can use local raw materials and workers but save a lot in material consumption because up to 30 per cent less steel, cement and concrete are needed.

Prefabrication does not mean you need to forget design, aesthetics and structural stability. On the

contrary, prefabricated structures can be used even in seismic areas.

Concrete facades allow for a gamut of surface treatments and can be coated with plaster or paint, brick, ceramic tiles, or natural stone.

Design possibilities are multiple with openings, balconies and filigree elements, which, by the way, also provide ventilation.

Competitive costs

Precast technology makes it possible to manage even mega housing projects with highly competitive costs and schedules.

With precast building and design, expanding cities can provide people with affordable housing where they can learn, live and grow in a healthy community.

How to establish a precast concrete plant?

Ismo Kallio, Vice President Sales at Elematic, a world-leading precast concrete production technology supplier, gives the following



advice to anyone considering of starting in the precast concrete business.

1) Define the present and future needs for the production: the slab types, volume, and capacity.

Will you be producing precast wall elements, floors, piles, or non-load bearing partition walls? Will the focus be on one specific slab type or will you offer a wider selection? These factors will affect the optimal factory layout, machinery, and floor area needed.

2) Define plant capacity

It is important to define this carefully as capacity affects the machinery, storage and logistics needed.

Think about future needs for capacity expansion and include them in the factory layout. When the need for higher volume capacity emerges, the machinery can be updated and more production lines can be added quickly and efficiently.

3) Get to know the local laws, regulations, fees, documents and processes.

There are country-dependent rules that may concern the end use of the product, the construction processes, or environmental issues.

4) Consider recruitment

What is the employee situation in the location? If the man-hour cost is reasonable and skilled personnel are available, a high level of automation may not be needed.

If the man-hour cost is high or the plant is large, a high level of automation is often necessary.

Elematic precast plants enable high-quality production regardless of the automation level.

For example, the SEMI wall and floor lines with low level of automation offer great value for money for the start-up factories, with the capacity of up to 600 square metres per day.

For more information, visit <https://www.elematic.com>
You can contact the Elematic OYJ team on phone - +358 3 549511
or by sending an email to: marketing@elematic.com



The magic of modular construction

While builders are often reluctant to adopt new technology, the changing nature of the industry is driving many to experiment with modular construction.

Though not a new concept, modular construction has recently seen remarkable technological upgrades that have led to a change of mindset for many builders.

For starters, modular construction is a form of off-site construction that

involves the manufacturing of building components or modules in a factory. The modules are then shipped to the construction site for assembly to create a finished building.

The interchangeability of these modules offers many benefits to contractors, making modular construction an increasingly popular method of construction.

According to David Hartley, managing director at MTX Contracts, a UK-based modular construction firm,

this technology could help address skills shortage as more people can get involved in construction without leaving their hometowns.

“I think what we are finding, particularly post-pandemic, is that people are less willing to travel away from home, and we are seeing a trend to work within your local geographic area instead of travelling all over the country,” he says.

One of the main advantages of modular construction is improved efficiency. The controlled environment of a factory setting allows for greater precision and accuracy in the manufacturing of building modules.

Speed up work

Moreover, modular construction allows for the simultaneous fabrication of multiple building modules, which can speed up the construction process.

In addition to quickening construction work, this technique can also cut costs. This is possible because the ability to manufacture building modules in a controlled environment allows for better inventory management and waste reduction.

Besides, the use of interchangeable building modules can significantly cut the costs of material and labour as the modules can be assembled quickly and easily on-site.

“Modular building processes are designed to be streamlined and efficient, which massively reduces the amount of energy used and waste created during a project,” says Dan Allison, divisional director at Net Zero Buildings.

“Modular buildings

are also able to be reused and recycled, rather than demolished, which significantly reduces the amount of energy and carbon that a building is responsible for creating.”

Another benefit of modular construction is improved safety. The controlled environment of a factory setting allows for greater safety measures to be put in place, reducing the risk of accidents and injuries.

Additionally, the use of modular building modules reduces the need for heavy machinery and other equipment on-site, further reducing the risk of accidents.

Modular construction also offers greater flexibility and customization. The use of interchangeable building modules allows for greater design flexibility, as buildings can be customized to meet the specific needs and preferences of clients.

Additionally, the use of modular building modules allows for easy modification of buildings, making it easier to adapt to changing needs over time.

Tackling waste

And as climate change continues to be an extremely important topic, builders may increasingly turn to modular construction to tackle the huge volumes of waste and emissions generated by the industry.

According to a study by academics from the University of Cambridge and Edinburgh Napier University in the UK, factory-built homes can produce up to 45% less carbon than traditional methods of residential construction.

The study was con-



ducted on two schemes in London, Ten Degrees Towers in Croydon and the Valentine, a 10-storey student hostel in Redbridge – both buildings were built by Tide Construction and Vision Modular Systems in 2020.

Ten Degrees is the tallest modular-built structure in London, UK.

The study found that both buildings achieved embodied carbon savings of 41% and 45% when compared to traditional methods of construction.

Wayne Oakes, director at engineering consultancy company Dice, agrees that modular construction can boost sustainability.

“Maintaining control over workflows, processes, and waste disposal management means that a project can be fulfilled on target and could mean that they can better adhere to sustainability initiatives that are often pushed aside when projects are delayed,” Oakes says.



Technology allows for the simultaneous fabrication of modules, which can speed up work on site.

He adds that the benefits of working offsite are also environmental and better assist us in our fight against global warming.

The use of modular construction is not limited to new construction. It can also be used in retrofitting and renovation projects. Building modules can be made off-site and customized to fit existing buildings, allowing for a more efficient and cost-effective renovation process. ■

The rapid growth of e-commerce in Kenya has led to an increased demand for high-quality warehouses from digital retailers seeking to boost their online sales.

This has prompted property developers to set up modern warehouses in strategic locations to meet the demand from local and international companies in need of space, according to a report by real estate consultant Knight Frank.

The realtor's Kenya Market Update for the second half of 2022 points out that e-commerce firms are increasingly looking for quality warehouses, especially in Nairobi, amid an enduring shortage of such facilities.

"There is a rising demand for quality industrial facilities (Grade A) since an overwhelming number of the existing stock is outdated and does not meet the threshold standards for modern warehouses," the report says.

This existing market niche is currently being exploited by Africa Logistics Properties (ALP), the developers of ALP North and ALP West.

ALP, a modern warehouse supplier, in the recent past completed Phase 4 (ALP Kyoga) of their West Logistics Park - located in Tilisi, along the Nairobi-Nakuru Highway, and covering 49 acres on which 8 phases are planned.

Green building

Phase one is complete and has an occupancy rate of 86%. Construction of phases two and three is underway. ALP warehouses are Grade A, and they all accommodate green building credentials in their design.

Thanks to the rising demand, prime monthly industrial rents stabilized at about Sh70 per sq. ft. during the second half of 2022 - a 5% increase compared to a similar period in 2021.

"The slight improvement was mainly attributed to the easing of



ONLINE COMMERCE FUELS WAREHOUSE DEMAND

By John Nduire

mobility restrictions, which propelled recovery in the industrial sector," Knight Frank says.

The report echoes earlier survey findings by Broll Property Group which in 2018 anticipated a ware-

house development boom in the country as the number of online shoppers continues to escalate.

"The growth of e-commerce in Kenya has led to increased demand for warehouse spaces. This is a result of a change in shopping habits in favour of home deliveries as opposed to conventional shopping," the company said in the Broll Sub-Saharan Africa Snapshot 2017.

The shift from brick-and-mortar shopping to e-commerce had seen many small-scale online retailers express interest in leasing warehouses in Nairobi, the report said.

Sh420 billion

With revenues in the Kenyan e-commerce market projected to hit Sh420 billion, up from Sh190 billion in 2017, according to AC Nielsen, online shopping is emerging as an essential part of the local economy.

And as retailers continue to expand their inventories while pushing for same-day deliveries, the need for warehouses in Nairobi will shift from the traditional nodes in the Industrial Area to newer nodes on Mombasa Road, Eastern Bypass, and Thika Road, which have "newer warehouses, coupled with improved infrastructure and access".

Broll, however, noted that the local market predominantly has Grade-B and Grade-C spaces, with Grade-A warehousing still in its infancy stage.

The hot market is expected to create opportunities for owners of bulk space who can afford to build high-quality warehouses to meet current e-commerce standards.

A 2018 report by Britam Asset Managers (BAM) also anticipated a warehouse development boom in the country.

The report showed that specialised warehouses were the most sought-after industrial properties by global retailers



▶ seeking to set up shop in the country. “Quality warehouses remain scarce in the Kenyan market, and this presents developers with an opportunity to undertake warehousing projects,” the report said, citing infrastructure upgrades as the main catalyst for the sector’s success.

Sh620 per sq. m

Real estate firm JLL noted that developers in Nairobi estimated that for new prime industrial developments to be feasible, monthly rentals of at least Sh620 per sq. m should be achieved.

“If rental levels drop below this threshold, new prime developments tend not to be feasible. Sustainable and affordable rental levels will therefore remain a major factor affecting the growth of the prime industrial sector,” wrote JLL.

Ordinarily, most warehouses in the country are situated in the top three cities of Nairobi, Mombasa and Kisumu, with major nodes located on



High quality (Grade A) warehouses remain scarce in the Kenyan marketplace.

Mombasa Road and Baba Dogo.

However, shortages of land and congestion in these areas are now forcing developers to shift focus to emerging nodes such as the Eastern Bypass, Ruiru, and Limuru.

Some of the key players in the sector include ALP, Tilisi Developments, Siginon Group, Kenya Industrial Estates (KIE), and Cold Solutions.

Tilisi Developments is developing a massive logistics and industrial park

in Limuru, Kiambu County, on the outskirts of Nairobi.

On the other hand, ALP has built several warehouses in Nairobi, including a 49,000 sq. m warehouse in Tatu City and a 14,000 sq. m warehouse in Redhill.

Nairobi-based Logistics company Siginon Group, which recently ventured into commercial real estate, has invested in a modern logistics park in Eastern Bypass.

At the same time, Cold Solutions, a private equity-backed cold storage provider, has just completed a 161,459 sq. ft. facility at Tatu City.

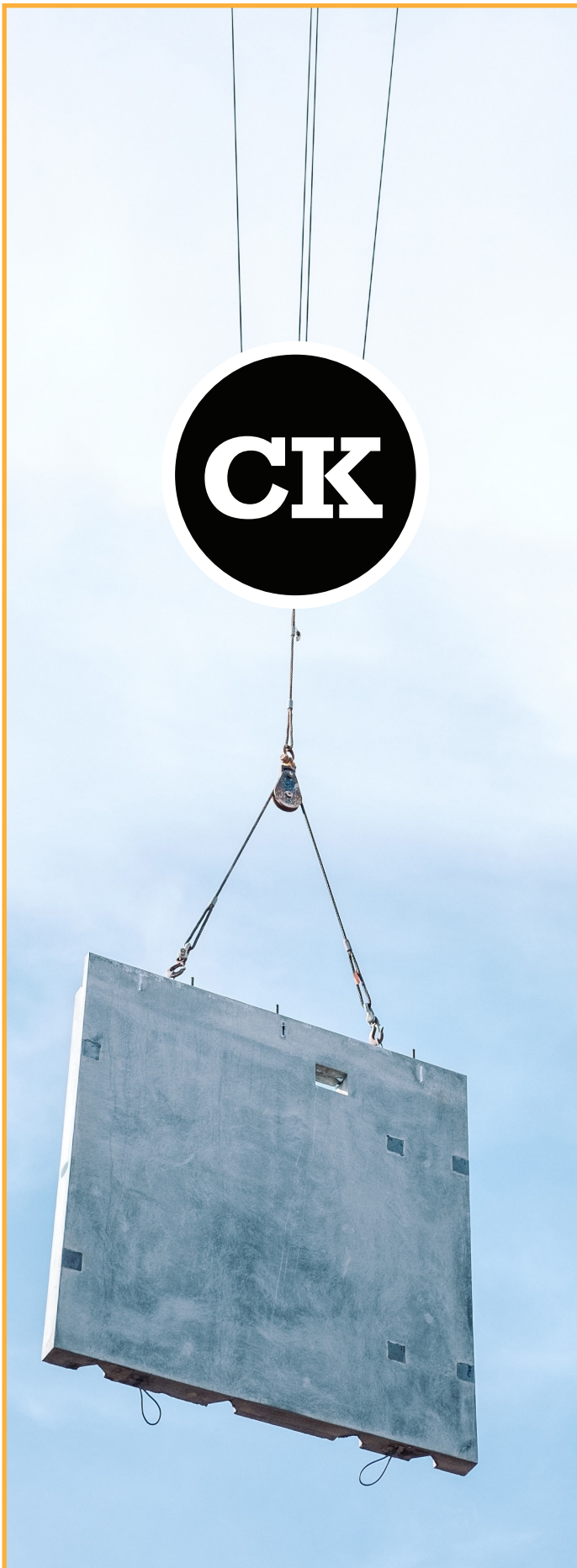
The facility is the largest of its kind in Kenya.

Still at Tatu City, a group of investors has broken ground for the construction of a high quality MSME-dedicated warehouse.

Dubbed The Link, the modern warehouse is expected to charge a monthly rent of Sh56 per square foot, with the minimum allowable space set at 9,127.80 sq. ft. ■



ALP North at Tatu City Industrial Park, Ruiru. PHOTO | Africa Logistics Properties



WE DO THE HEAVY LIFTING ■

Nairobi office market slows in H1 of 2023

Developers in Nairobi are pulling back from office construction as companies cut their office space demand amid a cocktail of challenges and new business realities.

The global economic slowdown, staff lay-offs, and remote working have impacted the uptake of office space in the city as companies seek ways to cut their costs, according to a report by real estate consultant Knight Frank.

“It has been observed that some companies are shelving their plans to take additional spaces in favour of remote working and co-working, as a way to cut their recurrent expenses,” Knight Frank said in its H1 2023 Kenya Market Update.

The rising cost of capital, coupled with developers’ struggles to service their loans, has led financial institutions to adopt a conservative approach in funding large real estate projects, resulting in subdued office construction.

As a result, the pipeline supply for 2023 remains subdued compared to previous years, with very few office developments expected to be completed this year.

“This may largely be due to the historic oversupply the office sector is experiencing, making

investors wary of heavily putting their money into this real estate class,” the report says.

In 2022, for example, 600,000 sq. ft. of grade A office space was introduced into the market, adding to a glut that continues to impact the office market negatively.

This has caused prime office rents to stagnate at \$1.20 (about Sh180 at current exchange rates) per square foot, per month, down from \$1.40 (about Sh210) five years ago.

During the period under review, occupancy levels in Nairobi fell 3.9% to 71.5%. The decline is attributed to additional grade A office space that was injected last year, combined with non-renewal of some leases.

While some companies, still smarting from the crippling impact of the Covid-19 pandemic, are continuing with flexible work schedule, many others are adopting work-from-home and hybrid work models to reduce their operative costs.

For that reason, many of these companies are reducing their space requirements, and that is lowering the demand for office space and, by extension, increasing existing vacancy rates in office buildings.

Kenya's leading electricity producer KenGen is scheduled to build a gigawatt-scale (1000 MW) wind farm in Marsabit, northern Kenya, as the push towards achieving 100% renewable energy intensifies.

According to a report published recently by Bloomberg, the company will seek debt funding to cover 75% of the required investment and finance the balance with equity.

The facility, the cost of which has not been disclosed, will unseat the 310 MW Lake Turkana Wind Farm, also in Marsabit, as the biggest wind farm in Africa.

It will also improve Kenya's position as a global leader in renewable power, with about 92% of the country's current capacity coming from renewables such as solar, geothermal and hydroelectric dams.

The 1000 MW wind farm is expected to be completed by 2028, which is two years before Kenya's deadline to achieve 100% renewable energy production.

The project will be developed in phases based on findings from feasibility studies conducted by the Agence Française de Développement, taking into account the increase in demand capacity and grid security requirements.

The wind farm is part of the company's revamped corporate strategy, which seeks to add 3,000 MW to the national grid within the next 10 years.

This will double the country's installed generation capacity to 6,000 MW.

KenGen is also advancing plans for the rehabilitation of its existing power plants to make them more efficient for the sustainable generation of electricity.

The company is advancing plans for an ambitious project to build a Sh110 billion energy park at Olkaria in Naivasha, Nakuru County.

The industrial park, whose construction will begin in 2025,



KENGEN TO BUILD AFRICA'S BIGGEST WIND FARM

will target industries such as fertilizer, iron and steel, textile, foods and beverages, among others.

The project will sit on KenGen's 1,824 hectares at the Olkaria geothermal hub.

"The proposed masterplan is scheduled to be implemented in four phases of five

years each, with the initial phase anticipated to kick off in the year 2025," Nema said in an earlier notice inviting public comments on the project.

The industrial park is expected to be completed in 2045.

In 2014, the company opened a search for a consultant to do a feasibility study on the project as well as to prepare a masterplan and budget for the same.

The consultant was also to create the energy park's implementation roadmap, marketing plan and financial model.

Feasibility study

In February 2016, KenGen appointed a South Korean firm to conduct a feasibility study for the project that would be completed in about two decades.

In 2017, it opened a search for build-own-operate-transfer contractors for the project that involves setting up an energy park, building manufacturing units, warehouses, and installation of steam generation facilities.

KenGen Energy Park will cater for all sizes of industries - from small to heavy industries - all of whom will enjoy cheaper electricity provided by the company.

Meanwhile, KenGen says it has invested into a 40MW solar photovoltaic pilot plant at the Seven Forks Hydro Stations in Eastern Kenya.

The solar power plant is expected to diversify revenues while taking advantage of the spaces around KenGen's projects for value-addition.

The plant will bank on the abundant solar energy in the region, reduce consumption of fossil fuels, diversify energy sources for electricity generation.

It will also help the company to master solar power generation technology.

According to KenGen, the solar plant will be set up on 80 hectares owned by the company, and free of human settlement. ■

Topcon's next generation of machine control

Machine control (MC) is advancing all the time and it can be difficult to know which tool suits you the best.

Automated machine control solutions, such as Topcon's MC-Max, help to increase processing power, speed, accuracy and reliability and can be installed on a full range of dozers and excavators, using basic modular components.

The latest solutions are linked to cloud software, which means that data can be saved and updated in real time, helping you to keep track of progress throughout the project.

This also means that machines can be controlled from remote locations. An operator could be in Portsmouth and control an excavator or dozer on a site

in Aberdeen. This has made remote working possible for the construction industry for the first time.

While the software capabilities have advanced, the system functionalities stay the same, so you can jump in and use it straight away if you've used the same operating system on older kit.

If you haven't used software like Topcon's before, these systems are simple to understand and full training is provided by the company.

Mounting solutions

In terms of the physical benefits, technologies like the MC-Max offer flexible mounting solutions, as well as optional automatic blade and bucket control for various machines.

One of the most significant differences between older machine control solutions and the latest automated kit is the antennas and sensors. Topcon's MC-Max solution uses two GPS antennas, mounted on the roof of the machine, which provide accuracy and



positioning of the blade, working in conjunction with the hydraulics.

Unlike the case with older kit, such as 2D or LPS systems, there are no masts or issues with getting the receivers off the blade, which improves visibility.

Topcon's solutions in the MC-X family use TSi4 sensors: one to measure the pitch and roll on the body of the machine, three sensors to measure the C frame which connect the machine and blade, and another sensor mounts on to the blade itself. These sensors detect the position of the machine in real time.

Previously this was done with two sensors, but more sensors offer improved accuracy as more data is available and the machine can perform more quickly.

Manufacturers like

Topcon are now utilising components that are used across different solutions for both dozers and excavators. This means there is now the flexibility to use your solution, like MC-Max, across multiple machines (after a base calibration from the installation team) without needing to purchase multiple components.

The excavator configuration can also be used on drills, hammers and compaction machines while the dozer system can also be used on graders. This can give you the ability to take your projects to the next level – with increased accuracy and efficiency.

Topcon Positioning Systems Inc. provides positioning technology for surveyors, civil engineers, construction contractors, and more.



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Artist's impression of a stadium. PHOTO | FILE

Military to begin upgrade of 'AFCON 2027' stadiums

The Kenya Defense Forces (KDF) are set to begin extensive renovations of the country's top stadiums after obtaining Cabinet approval.

The project, whose budget has not been made public, involves the renovation of Nyayo Stadium, Moi International Sports Complex, and Kipchoke

Keino Stadium in Eldoret.

It is part of the Sports Infrastructure Masterplan that includes the construction of a 60,000-seater Talanta Sports Complex at the Jamhuri Sports Complex in Nairobi.

A recent dispatch from the Cabinet said the approval of the construction and renovation projects of facilities hosting the Africa Cup of Nations (AFCON) 2027 was aimed at elevating Kenya's standing as a sporting powerhouse.

"The ambitious plan includes building the Talanta Sports Complex (Jamhuri, Nairobi) and extensive renovations of Nyayo National Stadium, Moi International Sports Centre Kasarani,

and Kipchoke Keino Stadium," the dispatch read.

The Cabinet said the signature project under the initiative would be the proposed Talanta Sports Complex, a 60,000-seater football stadium featuring world-class training pitches, an arena, and a commercial hub named the 'Hustler Bazaar'.

The Cabinet further said that the improvement of the standards of the mentioned facilities was meant to meet the Confederation of Africa requirements.

"These upgrades are designed to meet the high standards set by the Confederation of African Football (CAF) for this prestigious continental

event," the Cabinet said.

Kenya is currently in the midst of an ambitious effort to build stadiums across various parts of the country, with the goal of positioning itself as a competitive sporting destination while fostering talent development.

The projects have been hailed as a significant step forward in improving the country's sporting infrastructure, providing athletes with state-of-the-art facilities, and offering communities spaces for recreational activities and events.

However, despite the lofty goals and enthusiasm surrounding the projects, the construction of stadiums in Kenya has become a controversial subject.

Controversies over delays, stalling, and the delivery of underwhelming facilities have marred the implementation of these initiatives.

Many of the projects have fallen significantly behind schedule, due to a combination of factors, including budgetary constraints, logistical challenges, and unexpected construction issues. ■





Saudi royals restart work on world's tallest tower

The Saudi Royal family has restarted construction of what is set to be the world's tallest building, the one-kilometre-tall Jeddah Tower in Jeddah, Saudi Arabia.

Through Jeddah Economic Company (JEC), the Saudis recently invited 14 firms, among them China Harbour, China State Construction Engineering Corporation, Skanska, and Strabag to bid by December for a contract to complete the project.

"The tower is back in full motion," a source close to the project told the news agency MEED in September.

JEC, which is owned by

Kingdom Holding Company, the Saudi Royal family's investment vehicle, with a 40% stake, Bakhsh Group with a 40% stake, and Sharbatly Group with a 20% share, has been working on the project since 2014.

Construction of Jeddah Tower, initially known as Kingdom Tower, ground to a sudden halt in 2017 at 63 storeys, standing 250 metres.

At that time, Saudi Binladin Group (SBG), the contractor, had completed a third of the construction work for the superstructure of the tower.

Germany's Bauer had completed the piling work for the building.



Jeddah Tower, will be taller than Dubai's Burj Khalifa by 180 metres.

If the project goes as expected, Jeddah Tower will stand at an estimated 1,008 metres – over seven times the height of Nairobi's Times Tower.

It will comprise over 500,000 square meters of floor space and stand 180 meters taller than the Burj Khalifa.

The 252-storey tower will have 89 more floors than the 163-storey Burj Khalifa tower in Dubai, which is currently the world's tallest building.

"The floor count is 252 floors, with occupied floors being 167. It's a mixed-use development with 7 floors for offices, 7 floors for hotels, 11

► floors of service apartments, and different grades of housing all the way to the observatory tower,” JEC said in an earlier press statement.

The actual tower starts at just over 20 metres above ground level, led there by a ramp and podium around the tower. The largest floor in the building is 85,000 sq m consisting of a car park to accommodate 2,200 cars.

The contract for the construction of Jeddah Tower was initially signed with SBG for US\$1.2 billion, and the entire project is estimated to cost US\$20 billion.

Although SBG is no longer working as the project’s contractor, the consulting team remains the same, with Adrian Smith as the architect and Lebanon’s Dar al-Handasah (Shair & Partners) as the engineering consultant.

2-km-tall skyscraper

As this unfolds, Saudi Arabia has announced plans to build a 2-km-tall skyscraper in Riyadh.

According to a report by MEED, the tower will be built as part of an 18 sq. km project that is planned to the north of the capital city.

The report further said that the yet-to-be-named skyscraper will be funded by Saudi Arabia’s Public Investment Fund (PIF) to the tune of \$5 billion, based on quotes by contractors who have previously priced supertall buildings in the region.

At 6,561 feet (2,000 metres), the tower is expected to unseat Dubai’s Burj Khalifa (2,720 feet – 828 metres) from its position as the world’s tallest building.

The skyscraper will also offer the highest observation deck in the world.

The proposed tower joins a series of giga-projects that are either coming up or planned in various parts



ambitious \$500 billion futuristic city underway in Saudi Arabia’s arid northwest.

The 26,500 sq. km development, which is due for completion in 2026, will be a zero-carbon megacity that will be powered entirely by renewable, clean energy – thereby providing a model for sustainable living and development.

On the other hand, The Mirror Line – which is set inside the Neom megacity – is a massive project consisting of two towers up to 500 metres tall and 200 metres wide stretching for 170 km in a line across coastal, mountain, and desert terrain, connected by walkways

The narrow design is intended to reduce the man-made footprint on the landscape and promote efficiency within the city that will host

of Saudi Arabia as part of a highly ambitious drive to transform the Kingdom into a tourist, entertainment and adventure destination.

Others include Neom, The Mirror Line, Red Sea Project, Diriyah, Qiddiya, Asir, and King Salman Airport – all aimed to enhance the image of the Kingdom.

While all of the above giga-projects are astounding, Neom and The Line are incredibly impressive due to their scale and magnificence.

Neom – the Kingdom’s flagship project that was unveiled in 2017 – is a highly



Top: Ongoing construction of Jeddah Tower. PHOTO | COURTESY

Inset: An impression of Neom and The Line (right). PHOTO | COURTESY

about 9 million people.

The Mirror Line is designed as a roadless city – free of cars and carbon emissions, offering a new approach to urban design that will operate on 100% renewable energy, boosting the fight against climate change.

Within The Mirror’s mirrored, car-free walls, residents of will be whisked around in underground trains and electric air taxis. ■



How builders can rise above tech disruptions

Digital technologies are changing how built assets are designed, constructed, operated, and maintained.

Those technologies include building information modelling (BIM), prefabrication, wireless sensors, automated and robotic equipment, and 3D-printing.

Within 10 years, full-scale digitization could help the industry save between \$1 trillion and \$1.7 trillion annually, according to the Boston Consulting Group (BCG).

Players along construction value chain must prepare strategically and make the right moves to thrive amid the disruptions the new technologies could cause.

However, the many potential changes in the industry will make it difficult to predict the future.

To help, the World Eco-

nomics Forum, together with the BCG and over 30 global construction companies, have created three future scenarios:

- Building in a virtual world. AI, software systems and autonomous construction equipment replace most manual work throughout the construction value chain.

- Factories run the world. Construction moves largely to factories and the industry uses lean principles and advanced processes to pre-fabricate modules that are later assembled on-site.

- A green reboot. The construction industry uses sustainable technologies and new materials to meet tough environmental regulations.

It is still unclear which route construction will take, and very likely that the future will include elements of all three scenarios.

Current business models, strategies and capabilities will not be sufficient in any of these future worlds.

This underscores the fact that players along the construction value chain need to prepare strategically by taking the following actions:

- Attract new talent and build up required skills – as any future scenario requires talent with substantially different skills than today’s workforce possesses.

- Integrate and collaborate across the industry’s value chain – as the construction industry is characterised by a disintegrated and highly fragmented value chain, which hampers the seamless data flows that are essential in any future scenario.

- Adopt advanced technologies at scale – as the construction industry has been slow to adopt new technologies.



Globally, construction industry has been slow to adopt new technologies.

7 Bulletproof tactics for winning Gen Z talent war



Culture change

When Elon Musk, exasperated by the traffic in Los Angeles, tweeted his intention to develop a tunnel-boring machine and create underground roadways, many people would have dismissed it as a crazy idea.

However, by setting out a bold vision and creating a culture that is undaunted by tradition, Musk and other successful innovators manage to attract the best talent.

Tech and innovation

Embracing innovation and technologies helps builders to meet the talent challenge.

Automation, prefabrication, new collaboration tools, etc. will enhance productivity and cut the time spent on site.

Career development

Continuous learning and career development is crucial in a radically changing industry environment that requires different skills.

Construction firms should integrate continuous learning and research into their culture.

Incentives

Today's young talents look beyond salary packages and benefits, and emphasise flexibility ("own your time"), pur-

pose and ethics.

Construction companies should adapt their recruitment and retention schemes to reflect those new priorities.

Industry image

Construction still has a "dull and dirty" image, but companies are well positioned to create a more appealing image - of a dynamic and purpose-driven industry.

Construction stakeholders should team up to communicating the social-economic impact of the industry through sharing fascinating stories on social media.

Collaboration

The six actions listed so far may take some time to implement and will certainly take some time to succeed.

They require a shift in paradigm, spanning the entire construction ecosystem.

One crucial facilitator will be collaboration between companies - to leverage synergies and coordinate campaigns.

Collaboration with external organizations is likewise crucial - with universities, for instance, in providing continuous L&D of construction professionals and in tailoring curricula to the future needs of the industry.

According to the US National Association of Homebuilders, 82% of construction firms consider their main concern to be a shortage of construction workers.

In a recent construction survey conducted for the World Economic Forum, with more than 100 respondents, 77% of respondents agreed that the industry is not doing enough to attract talent.

Here are seven things the industry can do to attract young people.

Talent management

Traditionally, workforce management in construction was equivalent to liv-

ing a boom-to-bust cycle: hiring and firing followed the trend of the economy.

Winning the war for talent, however, requires a longer-term approach.

This involves strategic workforce planning: i.e., thinking strategically about the firm's future demand in terms of quantity and quality of skills, and the likely availability of those skills, to plan recruitment, and retention.



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