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# EUROPEAN BUSINESS COUNCIL

STRATEGIC COOPERATION & TECHNOLOGY TRANSFER

## ANNEX 1

DETAILED TECHNICAL BRIEFING  
Smart Infrastructure & Construction

ISSUED TO: His Excellency President Yoweri Museveni & The Cabinet of Uganda

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## 1. Executive Summary & Strategic Vision

Rapid urbanization and population growth in Uganda demand high-performance, cost-effective, and climate-resilient building technologies. This vertical facilitates the transition to sustainable modular construction systems, engineered specifically for high speed of execution, zero net energy (nZEB) standards, and extreme structural safety in the East African Rift Valley.

## 2. Strategic Project Portfolios

The following sections present the detailed technical catalogs, operational parameters, and physical assets for each strategic project under this vertical. The technical structures have been compiled from original engineering designs, and deployment models are aligned with the Ugandan national priorities.

### Project 1A: Dia Doxa Folex Hybrid Wall Systems

Dia Doxa Folex offers a hybrid modular technology designed for urban industrialization and thermal storage, solving key challenges in residential and commercial infrastructure. Using factory-fabricated modular composite panels composed of steel-reinforced concrete cores and high-density polyurethane insulation, it allows a complete 4-to-5 story social housing shell to be erected in days (1 floor per day). The structural weight of buildings is reduced by up to 60% compared to traditional masonry (a 4-ton composite wall replacing a 10-ton traditional brick wall), which dramatically reduces foundation costs and structural concrete requirements. The system provides extreme seismic shielding, certified to withstand earthquakes up to Magnitude 8 to 9 on the Richter scale, making it ideal for the active fault lines of the East African Rift Valley. In terms of thermal efficiency, Dia Doxa Folex chambers experience an incredibly low heat loss of only 1°C per month, reducing HVAC operational expenses by up to 85% and establishing a new paradigm for near-Zero Energy Buildings (nZEB) in equatorial climates.



*Figure: Dia Doxa Hybrid Wall: Core seismic shell integration detailing steel-reinforced concrete and high-density polyurethane insulation.*



*Figure: Dia Doxa Speed Assembly: Multi-story social housing shells constructed at a rate of one floor per day.*



Figure: Thermal Battery Core: Low-loss thermal insulation panel detail achieving less than 1°C temperature drop per month.

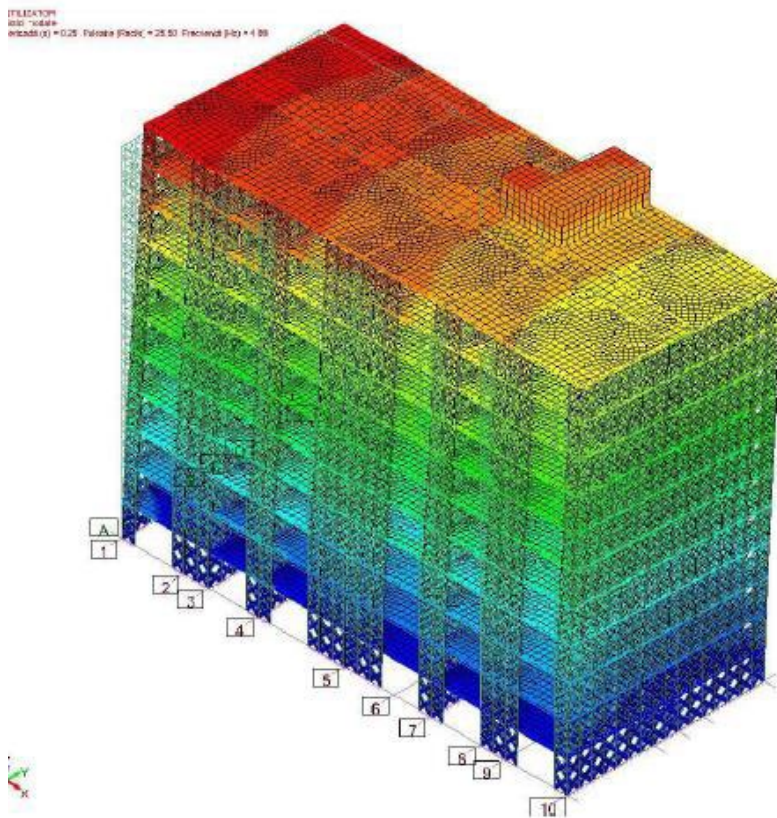
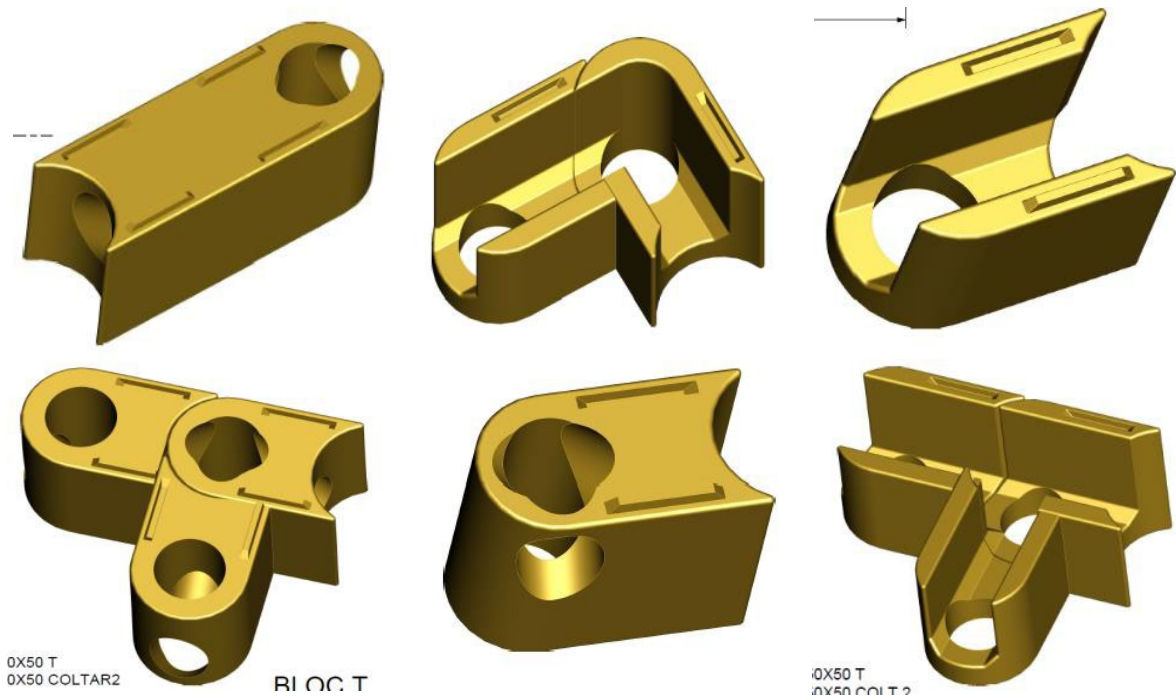


Figure: Seismic Validation: Shaking-table structural trial simulating tectonic stresses of Magnitude 8.0-9.0.



*Figure: Polyurethane can be molded in multiple shapes and with internal holes in which the concrete can be poured, which constitutes a network of highly resistant lattice pillars*

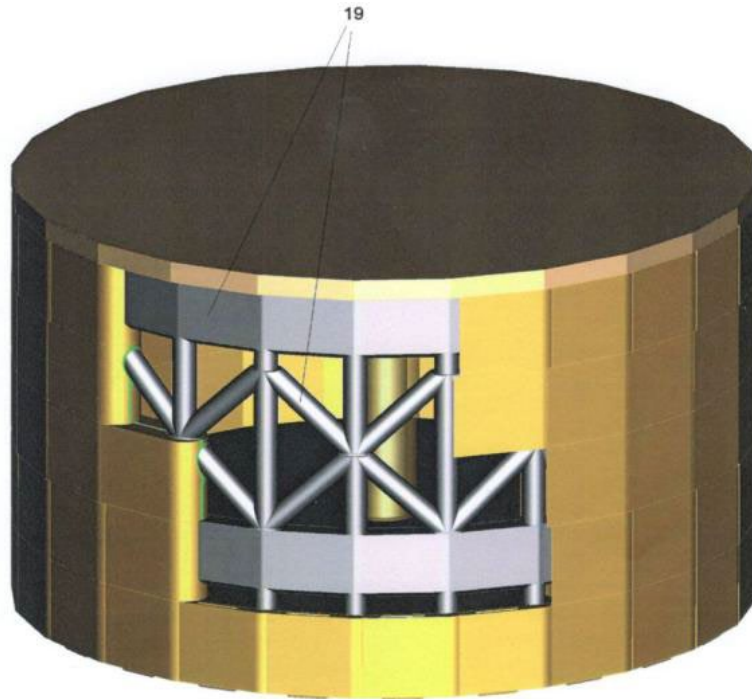


### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
<b>Assembly Velocity</b>	4-5 story shell completed in 5 days; individual homesteads in 48 hours; 10-story high-rise in 10 days.
<b>Structural Weight Reduction</b>	60% lighter overall weight (4-ton composite wall vs 10-ton traditional brick/concrete wall).
<b>Seismic Shield Rating</b>	Structurally certified for Magnitudes 8.0 to 9.0 on the Richter scale; ideal for tectonic active zones.
<b>Thermal Conservation Loss</b>	Only 1°C temperature drop per month (10°C loss in 120 days); eliminates HVAC energy spikes.
<b>HVAC Operational Savings</b>	Passive tropical cooling reduces air conditioning electricity consumption by up to 85%.
<b>Industrial Park Durability</b>	100% resistant to termite infestations, dry-season humidity warping, and intense UV degradation.

## Project 1B: NOE Technology for Utility Chambers

NOE Technology introduces an innovative and highly sustainable manufacturing method for utility connection chambers (water, sewage, electric, and telecom networks) that completely replaces traditional, slow precast concrete. The system utilizes lightweight composite polyurethane blocks containing hollow channels into which reinforced concrete is poured on-site. Smaller utility chambers are pre-assembled entirely in the factory, while medium and large chambers (for walls over 6-7 meters) are built modularly directly in the excavation pit. This composite material has a certified service life exceeding 100 years and has a 60% smaller carbon footprint than concrete. Because NOE chambers are 60% lighter, standard delivery trucks can carry three times the volume per trip, significantly lowering transit emissions and logistic expenses. Excavation-to-commissioning time is reduced from days to a mere 8 hours. The design also integrates specialized flexible medium-density polyurethane guide curves that guide cables and conduits safely, distributing mechanical stress and eliminating the risk of sharp edge damage or water infiltration.



*Figure: NOE Composite Chamber: Pre-assembled lightweight utility connection block replacing precast concrete.*





### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
<b>Concrete Material Savings</b>	60% less concrete consumption compared to traditional solid precast concrete chambers.
<b>Total Carbon Footprint</b>	Reduced by more than 50% across the material extraction and manufacturing lifecycle.
<b>Service Lifetime</b>	Certified lifespan of over 100 years with zero structural degradation or material rotting.
<b>Installation Timeframe</b>	Complete utility chamber installation and backfill accomplished within 8 working hours.
<b>Logistics &amp; Cargo Efficiency</b>	60% lighter weight allows transport vehicles to carry triple the cargo volume per dispatch.
<b>Cable &amp; Conduit Protection</b>	Integrated medium-density polyurethane guide curves to prevent cable contortion and friction.

## Project 1C: Cold Storage & Thermal Ice Batteries

Agricultural stability requires robust cold storage solutions to prevent post-harvest food waste, which currently impacts 30% to 40% of fresh fruits and vegetables. By incorporating advanced Dia Doxa composite insulation panels and off-grid solar-charged thermal ice batteries, EBC's modular cold storage systems ensure produce remains safely preserved even during long grid blackouts. These systems lose less than 1°C per month in thermal energy, allowing stored cold energy from sunny intervals to be utilized passively over extended periods.



Figure: Off-Grid Cold Chain: Solar-powered cooling hub using advanced thermal ice batteries.

### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
Thermal Conservation	Under 1°C thermal energy loss per month under equatorial ambient temperatures.
Post-Harvest Loss Reduction	Reduces regional post-harvest decay of fresh produce from 40% down to less than 2%.
Grid Blackout Immunity	Integrated thermal battery ice cells sustain critical cooling for weeks without external power.
Export Value Multiplier	Allows Ugandan agriculture to consistently satisfy strict EU organic export temperature standards.

## Project 1D: Mega-Water Reservoirs & Storage Tanks

Managing strategic water resources in tropical regions is facilitated by high-capacity modular storage reservoirs. Utilizing monolithic hybrid concrete and polyurethane walls, the execution time for a massive 20,000 m<sup>3</sup> reservoir is reduced from 12 months down to 30 days. The high-performance thermal insulation keeps water temperature stable at 15-18°C and shields it from sunlight, eliminating the risk of algae blooms, bacterial growth, and waterborne pathogens, while the structural base resists significant seismic loads.



*Figure: NOE Rainwater Storage & Monolithic Water Vault: Subterranean high-capacity insulated storage and filtration tanks.*

### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
<b>Execution Timeline</b>	Reduces large reservoir (up to 20,000 m <sup>3</sup> ) construction time from 12 months to 30 days.
<b>Thermal Algae Shield</b>	Maintains water at 15-18°C, preventing dangerous algae blooms and bacterial pathogens.
<b>Seismic Hydrostatic Rating</b>	Full structural resistance to severe groundwater pressure and magnitude 8 Richter earthquakes.
<b>Storage Capacity Range</b>	Scales modularly from 200 m <sup>3</sup> localized depots to 20,000 m <sup>3</sup> regional strategic reserves.

## Project 1E: Hot Bitumen & Petroleum Storage Tanks

Industrial energy and infrastructure require highly insulated bulk storage systems for hydrocarbons and hot road materials. Standard bitumen loaded at 160°C loses only 4-5°C per day within these specialized modular thermal storage tanks, keeping the asphalt fluid during long project delays caused by seasonal downpours. This insulation eliminates the massive daily diesel fuel consumption traditionally wasted on daily reheating cycles of solidified bitumen, while the internal concrete lining offers built-in fire and explosion protection.

### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
Thermal Retention Rate	Boiling-hot bitumen at 160°C loses only 4-5°C per day, maintaining optimal fluid state.
Reheating Energy Savings	Eliminates daily fuel-oil or diesel burners for asphalt plants, saving substantial costs.
Explosion & Fire Shield	Internal reinforced concrete lining acts as a physical blast and thermal barrier.
Tectonic Safety Factor	Engineered to withstand seismic shockwaves near active Rift Valley pipelines.

## Project 1F: Underground Bunkers & Strategic Defense Bunkers

Securing critical assets, regional command centers, and tactical military depots requires extreme structural resistance. Monolithic hybrid structures built with steel-reinforced concrete cores and thick polyurethane insulating shells deliver outstanding ballistic protection, blast shockwave dissipation, and seismic safety ratings up to Magnitude 8 on the Richter scale. The high-performance thermal seal keeps the subsurface microclimate stable, protecting sensitive communications electronics and defense gear from tropical moisture and condensation.

### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
Seismic Protection Shield	Certified to withstand magnitude 8.0 to 9.0 tectonic shockwaves without structural fracture.
Passive Microclimate	Under 1°C temperature variation per month, preventing moisture condensation on hardware.
Ballistic Blast Shielding	Reinforced monolithic composite core dissipates high-yield ammunition and physical shockwaves.
Erection Velocity	Complete underground tactical shelter or command post assembled in under 5 working days.

# Project 1G: Certified Patents & Original Blueprints

Dia Doxa hybrid wall systems and NOE composite utility chambers are backed by international and national certified patents. These engineering blueprints cover advanced seismic-resistant composite structural connections, modular utility channel mold systems, and optimized thermal barrier protocols.

(19) OFICIUL DE STAT  
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(73) **Titular:**  
• BREAZ LAURENȚIU-DUMITRU  
STR. 8 MARTIE NR.9, AIUD, AB, RO

(72) **Inventor:**  
• BREAZ LAURENȚIU-DUMITRU  
STR. 8 MARTIE NR.9, AIUD, AB, RO

(74) **Mandatatar:**  
INTELLECTUAL PROPERTY OFFICE  
S.R.L., STR. ALEXANDRU MORUZZI NR.6,  
BL.B6, SC.2, AP.62, SECTOR 3,  
BUCUREȘTI

(56) **Documente din stadiul tehnicii:**  
GB 1170103, DE 2188006

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(54) **ELEMENTE MODULARE, REȚEA, STRUCTURĂ DE REZISTENȚĂ, CONSTRUCȚIE ȘI PROCEDEU DE OBTINERE**

(57) **Rezumat:**

Invenția se referă la niște elemente modulare din material izolan pentru construcții, la o rețea obținută prin asamblarea elementelor modulare, la o structură de rezistență obținută prin turnarea unui material ce se întărește în rețeaua formată prin asamblarea elementelor modulare, la o construcție obținută prin asamblarea elementelor modulare și unirea lor prin structura de rezistență, precum și la un procedeu de obținere a acestei construcții. Elementul modular pentru construcții are un corp de formă paralelipipedică, ce cuprinde o față superioară, o față inferioară și patru fețe laterale ce se extind vertical între fețele superioară și inferioară, corpul menționat cuprinzând în interior cel puțin două canale oblice (5), între care este prevăzut cel puțin un canal vertical (4), ce unește fețele superioară și inferioară ale corpului, canalele menționate comunicând între ele pentru a forma cel puțin un semipod principal (2), elementul modular fiind prevăzut și cu elemente de înbinare (8) cu un alt element modular, caracterizat prin aceea că respectivele canale oblice (5) se extind din zona mediană cel puțin a feței superioare a corpului către muchiile inferioare ale fețelor laterale ale corpului, formând seminodurile secundare (3).

Fig. 1

Revendicat: 10  
Figuri: 7

Examinator: ing. IONESCU ANCA

Orice persoană are dreptul să formuleze în scris și motivat, la OSIM, o cerere de revocare a brevetului de invenție, în termen de 6 luni de la publicarea mențiunii acordării de acoperire a acesteia.

(12) **United States Patent**  
**Breaz**

(54) **MODULAR ELEMENTS, NETWORK, SUPPORTING STRUCTURE, CONSTRUCT**

(76) **Inventor:** Laurentiu Dumitru Breaz, Str. 8 Martie nr. 9, 515200 Aiud, Jald. Alba (RO)

(\*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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**E04B 2/00** (2006.01)  
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(52) **U.S. Cl.** ..... 52/503; 52/606; 52/607; 52/284; 44/685; 44/6106

(58) **Field of Classification Search** ..... 52/503, 52/504, 505, 425, 284, 604, 605, 606, 607, 52/439, 437, 419, 565, 596; 44/685, 106, 44/6117, 118, 122; 405/284, 286

See application file for complete search history.

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(10) **Patent No.:** **US 7,802,410 B2**  
(45) **Date of Patent:** **Sep. 28, 2010**

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Primary Examiner—Robert J Canfield  
Assistant Examiner—Babji Deuren  
(74) Attorney, Agent, or Firm—Andrew Wilford

(57) **ABSTRACT**

The invention relates to modular elements made of insulating materials for constructions, provided with at least one network element in the interior; to a network obtained by connecting modular elements; to a supporting structure achieved by casting a hardening material in the network achieved by connecting the modular elements and joining them through the supporting structure, as well as to the process for obtaining thereof. The modular element has an interior network element made up of at least two main half-joints and optionally it may have one or more secondary half-joints, connected through vertical and oblique channels. The network obtained by assembling the modular elements is made up of main and secondary joints, connected through vertical, horizontal and oblique channels. The unitary supporting structure is obtained by casting a material that will be hardened in the unitary network for the entire construction. The process for obtaining the construction according to the invention consists of the following: connection of modular elements and the casting of material that hardens in the network defined through the connection of modular elements and the creation of a unitary supporting structure.

17 Claims, 7 Drawing Sheets

## Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
Seismic Wall Patent	Patent cover for Dia Doxa structural interlocking seismic hybrid concrete panels.
Utility Chamber Patent	Composite utility chamber casting mold patent detailing structural joint reinforcements.

## Project 1H: Sustainable Concrete Roads & Highways

This infrastructure initiative addresses the national priority of upgrading Uganda's dirt roads to modern, climate-resilient asphalt and concrete highways. Utilizing rigid concrete bases and specialized subgrade drainage layers, these roads are engineered to withstand tropical soil expansion, severe water runoff erosion, and high surface temperatures. By preventing moisture infiltration and subgrade shifting, the service life of public highways is doubled, substantially delaying municipal maintenance cycles.



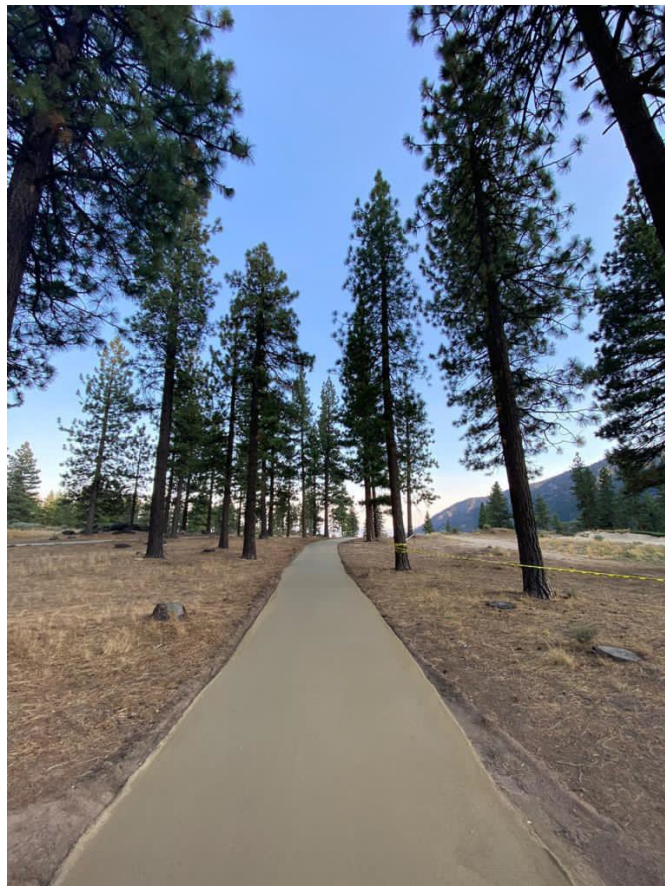
*Figure: Sustainable Highway Base: Grader paving operation leveling the concrete subgrade course under intensive equatorial heat.*



*Figure: Subgrade Course: Heavy machinery preparing the structural roadbed to ensure uniform weight distribution.*



*Figure: Soil Compacting: High-capacity roller compactor stabilizing subgrade course to prevent tectonic shifts.*



*Figure: Concrete Paving: Slip-form paving machinery pouring the high-durability rigid concrete base layer.*



*Figure: Finished Road: Completed climate-resilient concrete logistical corridor ready for heavy commercial trade.*

### Key Technical Parameters & Specifications:

Technical Parameter	Specification / Performance Capability
<b>Subgrade Drainage Shield</b>	Engineered water runoff management preventing subgrade softening and asphalt cracking.
<b>Pavement Service Lifespan</b>	Rigid base stabilization doubles traditional pavement service life under heavy cargo loads.
<b>Thermal Runoff Deflection</b>	Protects asphalt layers from high-temperature warping and intense equatorial solar exposure.
<b>Maintenance Cost Savings</b>	Decreases national road maintenance and reconstruction expenses by up to 50% over a 20-year cycle.

### 3. Bilateral Facilitation & Execution Model

EBC coordinates the import of raw composite compounds and mold frameworks, establishing localized casting factories in Uganda. This ensures local job creation, technology transfer, and direct training of Ugandan engineers under international supervision.

### 4. Protocol & Technical Validation Notice

**PROTOCOL ACCORD:** This strategic document is prepared under bilateral partnership guidelines and is subjected to technical audits by EBC scientific and tactical councils. The deployment parameters mentioned are mathematically validated and scale-tested across active European and regional deployment sites. Transfer of technologies is bound by sovereign bilateral agreements and international intellectual property protocols.