

Structural design and analysis of a truss frame for lifting sunken fuel trucks, tractor and vehicles from lake Khuvs gul

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ABSTRACT


The truss frame construction is an important part of the lifting system, which is mounted on pontoon and use in lifting of vehicles from lake depth. Designed modular multi cube frame, suitable for the mounting in PMP Floating Bridge. The truss frame is was used in the process of lifting the sunken vehicles from the 35-171 m depths. According to the actual working conditions, the load combination of frame is considered, and the safety design during the move in wave. On the basis of finite element analysis, three types of the truss frame were analysed with appropriate loads. Fabricated one truss frame and it was proved in real process that the frame met the load test. Using this truss frame, 10 vehicles were pulled out of the depths of Lake Khuvs gul during the summer lifting operations of 2023 and 2024.

Keywords: *Truss frame design, lake Khuvs gul, lifting force, sunken vehicles, truss frame on PMP pontoon, modular multi-cube system, salvage, stress*

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Ancillary services for HVDC dispatching control in Mongolia: Development of a strategy

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ABSTRACT

As power systems evolve with increasing integration of renewable energy and cross-border interconnections, ancillary services (AS) play a critical role in ensuring operational stability, reliability, and resilience. This paper explores the categorization, technical functions, and procurement mechanisms of AS in both high-voltage alternating current (HVAC) and high-voltage direct current (HVDC) systems, highlighting their complementary roles in hybrid grids. In Mongolia, where renewable penetration is accelerating under the “Vision 2050” policy and international electricity trade is emerging, there is an urgent need for flexible and reliable AS. The paper examines Mongolia’s current AS framework, noting reliance on external support for key services like black-start and frequency regulation. It further investigates how HVDC technology can address challenges in long-distance transmission from remote areas like the Gobi Desert. Drawing from international hybrid HVAC/HVDC case studies, the paper discusses implementation challenges in Mongolia and proposes recommendations for developing a robust, market-based ancillary services framework suited to the country’s evolving grid architecture.

Keywords: *service model, power system stability, frequency regulation, voltage control, dispatching strategy.*

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Early-age temperature effect on the properties of concrete cured by electrical heating in cold weather

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ABSTRACT


Electrical heating is one of the concreting methods widely recommended in the literature as a rapid curing technique for extreme cold weather conditions. This paper investigates the temperature development within reinforced concrete slab specimens when heated using electrical heating cables, and discusses the key findings. Two types of electrical heating cables—one with a steel core and the other made of silicone carbon fiber—were used with different pitch lengths. The compressive strength results revealed lower long-term strength in specimens that experienced high internal temperature development, particularly those with peak temperatures exceeding 70 °C. Microstructural analysis of these specimens showed coarser pore structures and weaker interfacial transition zones, which are likely primary contributors to the observed reduction in strength. The study also evaluated the use of thermostats to control internal temperature development. During the initial heating stage, electrical heating provided a steady temperature increase until the designated temperature of 40 °C was reached. Beyond this point, the internal temperature of the specimens remained above 40 °C for over 60% of the total curing period, sustained solely by the heat generated from cement hydration. These results indicate that combining electrical heating with insulation can result in substantial energy savings—an important consideration for construction practitioners.

Keywords: *cold weather concreting, electrical heating, compressive strength, pore structure, interfacial transition zone.*

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Urgent needs of flood resilience in the suburban areas of the upper Selbe river, Ulaanbaatar, Mongolia

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ABSTRACT

Flooding represents an increasing hazard in Ulaanbaatar, Mongolia, driven by rapid urban expansion, settlement encroachment into floodplains, and increasing rainfall variability due to climate change. This study assesses the flood hazard and resilience needs in the suburban areas of the upper Selbe River through an integrated hydrological and hydraulic modelling approach. Rainfall-runoff processes were simulated using the Storm Water Management Model (SWMM), while two-dimensional hydraulic modelling with HEC-RAS was applied to generate flood inundation and hazard maps for a 100-year return period event. Results show that approximately 48% of the modelled area (1,407.24 hectares) is subject to inundation, with 13,190 households estimated to be at risk along the Selbe and Bilgekh rivers. A significant proportion of settlements falls within low to moderate hazard zones, with localized areas exposed to significant hazard levels. Based on these findings and international recommendations, this paper identifies urgent measures to enhance flood resilience, including the establishment of river protection zones, construction of flood control infrastructure, restoration of wetlands, and implementation of early warning systems. The study provides critical evidence to inform policy, planning, and mitigation strategies for flood risk reduction in Ulaanbaatar's vulnerable suburban communities.

Keywords: *Flood resilience, flood hazard mapping, Unplanned settlement, Selbe river, suburban area of Ulaanbaatar.*

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Morphology and sediment transfer of the Selbe river

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ABSTRACT

The study of the morphodynamics of the riverbed, sediment transport and their sources is of great importance and necessity in the development of water structures, road bridges, urban planning and grounds for protecting urban populations and property from flash floods. The aim of the study is to identify the nature and transport of the Selbe River, which has been severely affected by human activity in the center of Ulaanbaatar. As part of the study, 40 points were selected along the length of the river around Ulaanbaatar (from the Dambadarja Bridge to the Tuul River), the roughness coefficient of the riverbed, the nature of sediments and the cost of transportation along the river. According to estimates, the roughness coefficient of the Selbe River bottom is on average from 0.01 to 0.029, and the initial sediment flow is from 2 to 94 m³/s. In the study area, the sediment size of the Selbe River decreases downstream from the beginning of the river, while the amount of sediment from the beginning of the river increases downstream from the beginning of the river.

Key words: *Roughness, diversion, bottom pump, drain*

Modeling the loss of stability of a thin-walled multilayer plate made of layered materials under impact

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ABSTRACT

In the process of operation, structures made of multilayer composite materials (CM) can be subjected to various impact effects leading to the formation of macro-cracks and delamination of layers. These damages lead to reduction of strength and reliability of such structures. The aim of the study is to analyze the influence of geometrical parameters of the delamination formed by impact and mechanical characteristics of CM on the magnitude of critical load and subsequent nonlinear deformation of CM. A refined approach to the analytical calculation of critical loads leading to the loss of stability of thin-walled layered CMs in a nonlinear formulation has been developed. The elastic characteristics of a multilayer thin layered package have been determined as a function of the elastic modulus, shear modulus, Poisson's coefficients and fiber orientation angle of the unidirectional layer. Coefficients for unidirectional CMs reflecting the contribution of each component (fiber, matrix) in proportion to its volume fraction, the so-called "mixture rule", were obtained. To determine the fiber content, the analysis of CM specimen sections using an electron microscope was carried out.

Keywords: *stability, composite materials, critical load, impact load, stiffness characteristics, defects, delamination*

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Integrating environmental factors, and community needs in public space planning: Lessons from Ulaanbaatar

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ABSTRACT

Public spaces in Ulaanbaatar's ger districts are limited, making their creation essential for improving urban livability. This study emphasizes the integration of environmental resilience and community needs into year-round public space planning. Despite growing urbanization, there is inadequate research combining environmental hazard mitigation with participatory design in the public space of ger areas. This study aimed to guide the planning of accessible, flood-resilient, and environmentally sustainable public spaces that meet diverse community needs. A mixed-method approach was employed, including focus group meetings, environmental assessments, flood hazard simulations, and wind/microclimate analyses at selected sites. Surveys were conducted in Bayanzurkh (243 participants) and Songinokhairkhan (306 participants) districts, with 65–67% of the respondents aged 6–24. Data were collected using paper questionnaires and Google Forms. Over 90% of respondents expressed the need for public spaces, with 40–50% advocating for year-round usability. Safety, comfort, and greenery were rated highly (4.6+ out of 5), while playgrounds emerged as a primary concern. Environmental assessments revealed noise levels of 50–60 dB and wind speeds of 13–15 km/h. Flood simulations provided resilient design recommendations. This study contributes to improving ger areas by offering evidence-based recommendations for flood-resilient and pollution-reducing public spaces. It also establishes the primary parameters for empirical surveys and provides information on future planning methodologies.

Keywords: *Public Space planning, Environmental resilience, Community needs, Mixed-method approach.*

Public space and universal design for streets in Ulaanbaatar, Mongolia

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ABSTRACT

The rapid urbanization of Ulaanbaatar has underscored the need for inclusive, accessible, and sustainable public spaces. Streets, as fundamental urban spaces, must be designed to prioritize pedestrian safety, ensure universal accessibility, and promote ecological resilience. The Urban Design Workshop at Citi University provided architecture and interior design students with a hands-on opportunity to explore solutions for an underperforming street segment. Through site analysis, interdisciplinary collaboration, and participatory design approaches, students proposed strategies for traffic calming, barrier-free accessibility, and enhanced green infrastructure. The workshop not only contributed to local urban design discussions but also demonstrated the educational value of experiential learning in addressing real-world urban challenges. By integrating academic research with practical applications, this initiative serves as a model for future urban development efforts in Ulaanbaatar. The findings reinforce the importance of participatory and universal design principles in creating safer, more inclusive, and sustainable urban environments.

Keywords: *Urban Design, Public Space, Universal Design, Streetscape Planning.*

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Understanding the knowledge and support needs of construction professionals in advancing green building practices

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ABSTRACT

Ulaanbaatar, the capital city of Mongolia, is recognized as the coldest capital city globally and is home to approximately half of the country's population. An estimated 20% of Ulaanbaatar's population lives in 745 precast panel apartment buildings (or 1,077 blocks) constructed between 1965 and 2000. Housing over 45,462 HHs, these precast panel buildings are characterized by poor thermal performance, and over 40% of heat loss is through the walls. While this inventory represents approximately 30% of Ulaanbaatar city's building inventory, the conditions of these buildings have significantly deteriorated due to almost 50 years of exploitation (freezing and thawing) and inadequate maintenance. Therefore, the adoption of green building practices is essential to promote sustainable development and mitigate the environmental impact of the construction industry. The successful implementation of green building practices depends largely on the knowledge, attitudes, and preparedness of construction professionals. This study investigates the current level of understanding among construction industry stakeholders regarding green building principles and identifies the key support systems needed to facilitate a more effective transition toward sustainable construction. Through a combination of surveys, interviews, data collection and data analysis, the research explores the gaps in technical knowledge, access to green materials, regulatory understanding, and institutional support. This study concludes by summarizing findings from stakeholder interviews and case studies, highlighting the varying levels of need in both theoretical knowledge and practical implementation of green building practices.

Keywords: *Green building practices, Knowledge gaps, Private stakeholder, Retrofit, Sustainable construction.*

Optimization of spray drying conditions of whole powder sea buckthorn (*hippophae rhamnoides l.*) Juice powder

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ABSTRACT

In this research, we explored the multifaceted effects of inlet air temperature (120–160 °C), Arabic gum level of (5–15g w/w), and maltodextrin DE20 level of (5–25g, w/w) on process variables utilizing the central composite design (CCD) within the framework of response surface methodology (RSM) to optimize the outcomes of spray drying (SD) for whole sea buckthorn (WSB) juice powder. The primary variables examined include the inlet air temperature during spray drying, the concentration of Arabic gum, and maltodextrin. The results indicate that adjustments to these parameters not only enhanced product yield but also contributed to favorable changes in color and moisture content in the final powder. Furthermore, these modifications helped retain the powder's nutritional integrity and phytonutrient properties, particularly by increasing the total phenolic content. The analysis revealed statistically significant differences ($p \leq 0.05$) in response surface models (RSM) for all tested conditions, with linear terms related to solute concentration emerging as the most influential factors. The optimal conditions identified for spray drying WSB juice powder were an inlet air temperature of 125 °C, combined with 3% (w/w) Arabic gum and 13.4% (w/w) maltodextrin DE20. The optimum temperature of the inlet air, gum Arabic and maltodextrin DE20 (w/w) is 125°C, 5g, w/w and 25g, w/w respectively, were the optimum condition of SD to receive fine WSB juice powder. This research elucidates the critical role of drying agents and temperature in enhancing the quality attributes of WSB juice powder, paving the way for improved formulation strategies in food preservation and nutrition enhancement.

Keywords: *Whole Sea Buckthorn Powder, Spray Drying, Central Composite Design, Response Surface Model, Optimization.*

Direct gas nitriding of additively manufactured maraging steels

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ABSTRACT

Additive manufacturing (AM) has been attractive for several engineering fields. In particular, metallic AM is very important in mechanical engineering. During metallic AM, metallic powder or wire is melted with scanning laser, electron beam or electric arc and quickly solidified. Microstructure of AM metallic parts is very different from casting and forging. Mechanical properties of AM metallic parts are also sometimes very different. In this report, microstructure of AM-maraging steels is discussed. As well, behavior of gas nitriding, which is a traditional surface hardening process with a heat-treatment in ammonia, is discussed on AM-maraging steels, in particular, influence of microstructure and building direction during AM processing.

Keywords: *Additive manufacturing, Maraging steels, Gas nitriding, Microstructure*

Development of antibacterial gelatin-based hydrogel for sustained infection control in biomedical

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ABSTRACT

The development of biomaterials with antibacterial properties is crucial for medical applications, particularly in preventing bacterial colonization on implanted devices. This study aimed to develop a gelatin-based hydrogel with immobilized Finibax (antibacterial agent, ABA) to provide sustained antibacterial activity against *Escherichia coli* (*E. coli*). Finibax was immobilized in gelatin hydrogels using 1-Ethyl-3-(3-dimethylaminopropyl)-carbodiimide and N-hydroxysuccinimide crosslinking. The immobilization process was validated through release studies, where approximately 50% of the ABA remained bound within the hydrogel, ensuring controlled release. Antibacterial activity was assessed using turbidity measurements and bacterial culture assays, showing that ABA-immobilized gelatin hydrogels effectively inhibited *E. coli* growth, maintaining comparable antibacterial efficacy to non-immobilized ABA solutions. Further evaluation demonstrated a significant reduction in *E. coli* colonies on the hydrogel surface, confirming sustained antimicrobial properties. In vitro cytotoxicity studies using human umbilical vein endothelial cells revealed no significant toxicity. Additionally, in vivo studies involving subcutaneous implantation in rats confirmed biocompatibility with mild inflammation, contributing to tissue regeneration. These findings suggest that the ABA-immobilized gelatin hydrogel possesses excellent antibacterial activity, sustained release capabilities, and good biocompatibility, making it suitable for infection-resistant scaffolds in tissue engineering and medical implants. Future research should focus on long-term in vivo evaluations and hydrogel composition optimization to enhance clinical applicability.

Keywords: *Antibacterial hydrogel, Gelatin-based biomaterials, Sustained drug release, Biocompatibility, Tissue engineering*

Improved performance of organic photovoltaic cells with ITO anode modified by molecular self-assembled monolayer

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ABSTRACT


Surface modification of indium tin oxide (ITO) using self-assembled monolayers (SAM)s of *para*-substituted benzenesulfonyl chlorides was employed to tune the anode work function (WF) in organic (PV) cells. Terminal groups (H- and Cl-) on the SAMs induced interface dipoles significantly altered the energy level alignment at the ITO/organic interface. Organic photovoltaic devices with an ITO/CuPc/C₆₀/Al structure, with and without a BCP thin interlayer, were fabricated and tested under 100 mW/cm² illumination. The results demonstrate that SAM-functionalized ITO enhances the hole injection barrier by improving energy level matching, which improves the device's performance.

Keywords: ITO, surface modification, chemical modification, PV cells.

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Experimental analysis of harmonic effects on power transformer in wind farm

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ABSTRACT


This study investigates the effects of harmonic distortion on the operation of a power transformer at the "Tsetsii" wind farm in Mongolia. Measurements were conducted under five different operating modes of the Tavan Tolgoi substation to evaluate how system configurations influence harmonic behaviour. The research involved the measurement of main power quality parameters and the analysis of harmonic content at voltage levels of 110 kV and 35 kV. Findings indicated that the total harmonic distortion (THD) at the 110 kV system bus exceeded the allowable limits prescribed by relevant standards, prompting the need for a 5th harmonic filter. Additionally, resonance at the 11th harmonic was identified, attributed to the inherent characteristics of the power supply network. To further mitigate harmonic distortion and improve overall power quality, the installation of additional passive filters tuned to the 7th and 9th harmonic frequencies is recommended.

Keywords: Power quality, Harmonics, Power transformer, Measurement, Wind power plant.

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Investigation of the effect of tilt angle on the performance of a solar power plant

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ABSTRACT

The tilt angle plays a critical role in determining the performance of photovoltaic (PV) power plants. When the tilt angle is adjusted such that incoming solar irradiance strikes the panel surface perpendicularly, solar energy absorption increases significantly, leading to improved overall efficiency. Therefore, optimizing this angle is essential for maximizing power output. The optimal tilt angle is defined as the angle between the solar panel and the horizontal plane that allows the system to capture the maximum amount of solar radiation during a specific period. This angle is influenced by factors such as geographical location, seasonal variation, and the sun's path across the sky. This study focuses on determining the optimal tilt angle that would enhance electricity generation from PV systems operating in Mongolia. Using PVsyst simulation software, two system configurations were analyzed and compared: one with a fixed tilt angle maintained throughout the year, and another with a seasonally adjustable tilt angle. The simulation results indicate that systems with seasonally adjusted tilt angles produce more energy than those with fixed angles. Specifically, increasing the tilt angle during winter months improves solar irradiance capture, while reducing it during summer enhances efficiency resulting in better year-round performance. This research provides valuable insights into tilt angle optimization for Mongolian PV power plants, which can lead to enhanced energy yield and improved economic viability. Future research could explore further performance gains through the integration of automated sun-tracking technologies, potentially maximizing both energy output and system efficiency.

Keywords: Photovoltaic modules, solar power plant, optimal tilt angle, energy production

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Study on installing a solar power plant at a landfill site in Mongolia

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ABSTRACT

Closed landfills pose a growing challenge for land reuse due to environmental and structural constraints. However, integrating photovoltaic (PV) systems into these landfills can provide the dual benefits of generating renewable energy and reclaiming idle land. In Mongolia, 93.5% of all waste is disposed of through landfills, with 396 waste collection points spread over 125,000 hectares. Ulaanbaatar alone generates 14.3 million tons of waste annually and has three major landfills: Tsagan Daba, Morin Daba, and Ulaanbaatar. This paper examines the technical, environmental, and economic feasibility of developing PV farms on closed landfills using case studies from the United States, Europe, and Asia. This analysis highlights how countries like Mongolia, with increasing energy demand and limited available land, can utilize closed landfills for sustainable solar energy production. It also provides policy recommendations to support practical implementation in similar contexts.

Keywords: *closed landfill, solar photovoltaic, Mongolia, renewable energy, land reuse, waste management*

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Improving indoor comfort and energy efficiency through architectural planning in single family house: A case study of Ulaanbaatar's climate conditions

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ABSTRACT

This research stems from a commitment to sustainable green development, addressing global efforts to enhance building energy efficiency and mitigate air pollution caused by non-standard construction practices in Ulaanbaatar's ger areas. The study focuses on the feasibility of designing energy-efficient single-family houses that ensure indoor comfort in Ulaanbaatar's harsh, cold climate. By integrating theoretical research and practical applications, the study explores passive and active design strategies to reduce energy consumption while maintaining thermal comfort and indoor air quality. The research methodology employs dynamic energy simulations using the "Energy Plus" software, widely recognized for calculating building energy performance. The study was conducted in two stages. In the first stage, various passive design methods were applied to a 45m² model house, reflecting the average dwelling size in Ulaanbaatar's ger areas. The energy consumption for heating and cooling was measured and compared to evaluate the effectiveness of each method. In the second stage, based on the findings from the first stage, the energy requirements for a 60m² single-family house accommodating a family of four were calculated and analysed, ensuring compliance with thermal and indoor air quality standards. The results indicate that the average annual energy consumption for heating, ventilation, and cooling could theoretically be reduced to the Passive House standard of 15 kWh/m² per year. However, the peak heating load exceeded the 10 W/m² criterion during winter months due to localized climate extremes. Nevertheless, the study demonstrates that combining well-planned passive design methods with energy-efficient active systems can enable the construction of energy-efficient houses in Ulaanbaatar's climate. Furthermore, the passive design strategies explored in this study have practical applicability and potential for development into energy-saving solutions.

Keywords: *Single-family house, Passive design, Energy efficient building, Green building, Sustainable building, Ulaanbaatar climate, Cold climate, EnergyPlus*

The improvement of microclimate design in residential sub-district used by the computational fluid dynamic

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ABSTRACT

A dynamic flow calculation of the microclimatic environment was conducted to determine ways to improve the environment using computational methods. This study was carried out in a specific area located in the of Bayangol, Ulaanbaatar, Mongolia, using the ENVI-met simulation tool to analyze the microenvironment. The climate conditions and examine potential solutions for reducing the impact of the Urban Heat Island (UHI) effect, the hottest day of July 2022 was selected for analysis in the mathematical model. The ENVI-met database consists of 3D vegetation elements, and road and roof vegetation cover were included in the modeling. The current environmental conditions were simulated using the ENVI-met program, and improvement methods were explored, such as using vegetations to provide wind protection in winter and cooling effects in summer while reducing heat. As a result, air temperature decreased by 0.16–0.63°C, and wind speed was reduced to 3.73 m/s. Although the changes were relatively small, this study demonstrated that a microclimate analysis can be conducted based on data-driven simulations. It provided insights into the current environmental situation and potential improvement strategies.

Keywords: *Microclimate, Ulaanbaatar climate data, ENVI-met, CFD.*

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A Study on the phase-out of HCFCs and the implementation of energy-efficient air conditioning systems in buildings

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ABSTRACT


Since 1996, Mongolia has actively phased out ozone-depleting substances (ODS) under the Montreal Protocol and is currently implementing the HCFC Phase-out Management Plan (HPMP). Despite rising urban temperatures and an increasing demand for cooling, many public buildings in Ulaanbaatar continue to rely on outdated and energy inefficient cooling systems. This study investigates strategies for improving energy efficiency in these systems, using a five-story department store located in central Ulaanbaatar as a case study. The building's cooling system was comprehensively assessed, and equipment specifications, energy consumption, temperature control, and user satisfaction were evaluated. The study identified several key inefficiencies, including the use of HCFC-based refrigerants, lack of automation, poor insulation, and constant-speed compressors. Proposed solutions include transitioning to inverter-based systems, implementing Building Management Systems (BMS), replacing ozone depleting refrigerants, and enhancing thermal insulation. These measures are projected to reduce energy consumption by 30 to 50%, lower greenhouse gas emissions, and improve indoor comfort. The findings provide practical recommendations for upgrading cooling systems in Ulaanbaatar and similar urban areas.

Keywords: *heat loads, energy efficient building design, reduce cooling loads.*

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Effects of drying as a preservation technique on the quality attributes and nutrient profile of Mongolian pasture-raised sheep spleen powder

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ABSTRACT


This research evaluated the impact of thermal drying temperatures (50°C, 60°C, 70°C) on the physicochemical, nutritional, and microbiological characteristics of sheep spleen powder, exploring drying as a method to extend shelf- life for food supplement applications. Fresh sheep spleens were pre-cooked, minced, dried to constant weight, ground, and analyzed. Drying effectively reduced moisture content (2.96-6.16%) and water activity (<0.3), ensuring microbial stability and extended shelf-life. The process significantly concentrated protein (~88%) and minerals, particularly iron (up to 292 mg/100g at 50°C), compared to fresh spleen. Conversely, fat and ash contents decreased, suggesting processing losses. Higher drying temperatures resulted in powders with lower L* and higher b* values, while a* values varied. Considering favorable color and likely better retention of heat-sensitive components, 50°C was identified as the optimal drying temperature. These findings demonstrate that thermal drying yields a stable, safe, and nutrient-dense sheep spleen powder suitable for food fortification and functional food development.

Keywords: *offal, optimal drying parameter, nutritional quality.*

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Engineering calculations and technology of lifting operations of sunken vehicles from lake Khuvsgul

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ABSTRACT

Cleanup of Khuvsgul Lake and removal of sunken vehicles was organized in 2021-2024 at the initiative of the President of Mongolia. The Sukhbaatar vessel, which sank near the Khatgal waterway stop, 110-120 m from the lake shore, was pulled out in October 2021, and 10 vehicles and equipment were pulled out from a depth of 33-171 meters near Khankh, Sant Uul, Maraan Bulan, Khachimyn Uzuur, Hereenii Uur, Anjistyn Davaa and Tuskhalyln Davaa on the east side of Khuvsgul Lake during the summer operations of 2023 and 2024. In poster presents information such as the operation management organization, lifting sequence, operation principles and stages, the sunken object locations, the basis calculations, the operation area, the personnel for the operation, the equipment to be used, the object relocation plan, calculations, the layout of the object, and some lifting plans.

Keywords: *sunken object locations, salvage operation area, lifting sequence, operation principles, lifting truss frame, underwater ROV, depth lifting plan.*

Research and experiment of vibrating mixer with inclined cylinder drum

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ABSTRACT

Mixing any granular materials to make one type of product is a complex process. A mixer designed for mixing granular materials was developed in this research work. It features a cylindrical drum positioned at an inclined angle on a horizontal axis and connected to an additional vibrating base. The research work involves the experimental determination of the primary parameters of the inclined drum, such as the single particle's trajectory length and the speed at which multiple particle trajectories get during the mixing process. For both the horizontally positioned cylindrical drum and the inclined position relative to the horizontal axis, the trajectory lengths of single particle movement and the speeds of multiple particle movements were obtained and compared based on experimental results. The vibration analysis was conducted by compressing the vibrating base of the cylindrical drum 3 mm along the height of the spring. The amplitude of the vibrations generated during the movement of a single particle within the drum with the vibrating base was determined experimentally. Experiments were carried out on the inclined cylindrical drum when connected to and not connected to the vibrating base, and the results were compared. The research was conducted by designing a new solution for a vibrating mixer with an inclined cylindrical drum. A new design solution featuring a vibrating mixer with a cylindrical drum was developed with the hypothesis that it would improve mixing performance, and a comprehensive research study was carried out to evaluate its effectiveness. **Keywords:** *Mixing efficiency, Particle trajectory, Amplitude, Vibration.*

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Engineering calculations and technology of lifting operations of sunken Sukhbaatar vessel from lake Khuvs gul

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ABSTRACT

Cleanup of Khuvs gul Lake and removal of sunken vehicles was organized in 2021-2024 at the initiative of the President of Mongolia. The Sukhbaatar vessel, which sank near the Khatgal waterway stop, 110-120 m from the lake shore, was lifted in October 2021. The poster presents information on various aspects, including operation management, principles and stages, solutions, operation areas, key techniques, technical parameters, force analysis and reaction forces, lifting process results, beam calculations, layout design and several lifting plans.

Keywords: sunken object locations, salvage operation area, lifting solutions, steel rope, PMP pontoon, lifting plan.

Methodological Approach to the Development of Mongolia's Electric Power System: Current Trend and Challenges

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ABSTRACT

Mongolia's energy sector is at a critical juncture, facing significant challenges that demand comprehensive technical and technological reorganization. This transformation is essential not only for the growth and composition of generating capacities but also for implementing quantitative and qualitative changes in the grid structure. These needs are driven by global energy development trends and the rising electricity consumption in Mongolia, which is closely tied to the country's socio-economic development goals as outlined in the long-term program "Vision 2050." To address these challenges, it is imperative to initiate a restructuring of the energy sector. This process should begin with comprehensive research to identify the primary directions for development, utilizing a scientifically grounded methodological approach. The integration of advanced energy technologies and modern management practices will be crucial to improving overall efficiency and intellectualizing management within the sector. The report provides an analysis of the current state of Mongolia's energy sector, highlighting key issues and proposing solutions based on a system-oriented methodology. Among the main outcomes of the author's research is the development of a hierarchical scheme for the future development of the power industry. This scheme treats the energy sector as an interconnected, integrated system and offers a methodological framework for creating a circuit solution for the newly established Unified Electric Power System (UEPS) with external connections. These connections are designed to facilitate its eventual integration into the "Asian Super Grid." The methodological tools developed in this research enable the identification of the most viable pathways for the comprehensive development of Mongolia's energy sector, considering both external and internal factors. The report presents the key findings of the research on the creation of Mongolia's Interconnected Unified Electric Power System (IUEPS) through detailed graphs, tables, and diagrams.

Keywords: *development, method, hierarchy, interconnected electric power system*