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A01

住宅空間使用耳機與揚聲器播放之差異化研究初探

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摘要

本文旨在探討不同住宅室內空間中耳機與揚聲器的使用行為偏好及聲場設計需求。提出住宅室內空間的使用功能框架，並透過對50名受測者進行問卷調查，分析了不同性別和年齡層在住宅空間中使用耳機與揚聲器的習慣及其聲場需求。研究結果顯示，不同性別在使用這些設備時存在顯著差異，女性較男性更偏好使用揚聲器，且對室內聲場設計的重視程度較高。男性則較女性更偏好使用耳機，且對目前的居住空間聲場環境較為不滿意。臥室是耳機使用的主要空間，而客廳是揚聲器使用的主要空間，這與假設的空間使用功能框架相符。本文的研究成果可為室內居住空間的聲場設計提供重要的參考依據，提升客戶室內生活品質及良好的聲學環境。

關鍵詞：室內聲學、聲音感知、耳機、揚聲器

A01

A Preliminary Study on the Differentiation Between Headphones and Speakers Usage in Residential Space

Abstract

This study aims to explore the usage preferences and acoustic design requirements for headphones and loudspeakers in different residential indoor spaces. The study proposes a functional framework for residential indoor spaces and conducts a survey of 50 participants to analyze the habits and acoustic needs of different genders and age groups. The results indicate significant differences in the use of these devices between genders; females show a stronger preference for loudspeakers and place greater importance on indoor acoustic design compared to males. Conversely, males exhibit a stronger preference for headphones and express greater dissatisfaction with the current acoustic environment of their residential spaces. Specific analyses show that bedrooms are the primary space for headphone usage, while living rooms are the main area for loudspeaker usage, aligning with the hypothesized space usage function framework. The findings of this study provide crucial insights for the acoustic design of residential interiors, enhancing the quality of life and creating a superior acoustic environment for inhabitants.

Keywords: Indoor acoustics, sound perception, headphones, loudspeakers

A02

醫療用壓縮空氣系統之能源成效評估-以台中某醫院為例

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摘要

本研究在評估醫療用壓縮空氣系統的能源效率，選取台中某醫院作為案例。隨著醫療設備的汰換更新，新系統在滿足醫療需求的同時，其能源效率表現成為關注焦點。本研究目標是透過比較新舊系統的能源消耗與壓縮空氣流量，來評估新系統是否達成預期的能源效率提升。

從醫院設備效率估算、電力分析及氣體流量計算。採用施耐德智慧電表等工具對壓縮空氣系統進行了一週的能源消耗監測。結果顯示，新系統的日均能耗為198.603kW/h，舊系統為126.482kW/h，新系統能耗增加了57%。此外，透過一種無需安裝額外氣體流量計的測量方法，新設備的實測流量為3.19m^3/min，高於廠商提供的2.8m^3/min，表現出性能上的優勢。

關鍵詞：能源效率，壓縮空氣系統，醫療用途，電力分析，氣體流量計算

A02

Energy Efficiency Assessment of Medical Compressed Air Systems – A Case Study of a Hospital in Taichung

Abstract

This study assesses the energy efficiency of medical compressed air systems, selecting a hospital in Taichung as the case study. As medical equipment is updated and replaced, the energy efficiency of the new systems becomes a focus of attention while meeting medical needs. The aim of this study is to evaluate whether the new system achieves the anticipated energy efficiency improvements by comparing the energy consumption and compressed air flow of the old and new systems.

Energy consumption was monitored for a week using tools such as Schneider Electric smart meters to measure the performance of the compressed air system. The results showed that the new system's average daily energy consumption was 198.603 kWh, compared to 126.482 kWh for the old system, representing a 57% increase in energy usage. Additionally, a measurement method that does not require the installation of an additional gas flow meter was used. The actual flow rate of the new equipment was 3.19 m^3/min, which is higher than the 2.8 m^3/min provided by the manufacturer, indicating a performance advantage

Keywords: Energy efficiency, Compressed air system, Medical application, Electric power analysis, Gas flow calculation

A03

都市風廊效益初探-以社區型集合住宅為例

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摘要

本研究以臺中市北屯區某集合住宅為案例，探討社區型集合住宅局部型風廊系統可適用的驗證及實踐方法。參考中央氣象局氣候資料將地區之長年自然風勢進行季節與時序的歸納，並依此定義環境數據。本研究採用 CFD 模擬作為研究工具，驗證小區及住宅的風廊系統是否具發展潛力。由模擬結果分析得知，迎風面住宅的棟距對風道的風速有一定的影響，外部風道對小區的微氣候有降溫的作用，而採用 CFD 模擬作為研究工具，有其學理上的參考價值，且提高了研究的經濟及省時等效益，適用於局部型風廊系統的評估作業。有助於台中市都市化發展的同時，改善熱島效應的衝擊，更加落實台中市宜居城市的願景。

關鍵詞：都市熱島、通風廊道、社區型集合住宅、CFD

A03

A Preliminary Study on the Differentiation Between Headphones and Speakers Usage in Residential Space

Abstract

This study takes a residential complex in Beitun District, Taichung City as a case study to explore the applicable verification and practical methods of local wind corridor systems in community-type residential buildings. Referring to the climate data of the Central Meteorological Administration, the region's long-term natural wind conditions are summarized in seasons and time series, and environmental data are defined accordingly. This study uses CFD simulation as a research tool to verify whether the wind corridor system in communities and residences has development potential. From the analysis of the simulation results, it is known that the distance between the buildings on the windward side has a certain impact on the wind quality of the air duct. The external air duct has a cooling effect on the microclimate of the community. Using CFD simulation as a research tool has its academic merits. improves the economic and time-saving benefits of research. It is suitable for the evaluation of local wind corridor systems. It will not only contribute to the urbanization development of Taichung City, but also reduce the impact of the heat island effect and further implement Taichung City's vision of a livable city.

Keywords: Urban heat islands, ventilation corridors, community housing, CFD.

A04

室內運動熱舒適度之研究-以逢甲大學第二舞蹈教室為例

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摘要

隨著新冠病毒的全球蔓延，台灣健身房產業面臨前所未有的挑戰，顯示了對優質室內運動空間的迫切需求持續增加。本研究利用 CFD 數值分析軟體，針對逢甲大學內體育館第二舞蹈教室的室內運動空間進行熱舒適度的模擬，旨在探討不同運動強度、使用人數及空調設置對空間空氣流場及熱舒適度的影響。本研究首先基於文獻回顧建立學理基礎，接著通過CFD模型進行模擬分析，最後根據模擬結果提出室內運動機械通風的建議。本研究實驗結果顯示，在綜合室內面積237.61m^2之舞蹈教室內之運動模式與使用習慣後，熱舒適度之影響程度排行依序為空調風速、空調開啟狀態、使用者數量、運動狀態。

關鍵詞：室內運動空間、熱舒適度、計算流體力學

A04

Study on Indoor Fitness Thermal Comfort - A Case Study of the 2nd Dance Studio.

Abstract

As the global spread of COVID-19 continues, Taiwan's fitness industry faces unprecedented challenges, highlighting an increasing demand for high-quality indoor exercise spaces. This study uses CFD numerical analysis software to simulate the thermal comfort of the second dance studio in the gymnasium at Feng Chia University. It explores how different exercise intensities, number of users, and air conditioning settings affect the air flow and thermal comfort of the space. The research first establishes a theoretical foundation through a literature review, then conducts CFD model simulations, and finally proposes recommendations for mechanical ventilation in indoor exercise spaces. Results show that in the 237.61m² dance studio, the factors affecting thermal comfort, in order of impact, are air conditioning wind speed, air conditioning status, number of users, and exercise intensity.

Keywords: Indoor sport space, Thermal comfort, Computational Fluid Dynamics

A05

住宅空間室內聲場客觀物理評估

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摘要

研究動機源於對居住環境品質的重視，特別是對於噪音控制和視聽空間的關注，研究本身更貼近現代人的實際需求，透過將實際量測值與估計值(電腦模擬及公式計算)進行比較，結果可得出室內裝潢和吸音材料的應用，有助於達成預期的餘響時間目標，而隔音性能的評估顯示大門在低頻段具有優越的表現，但在中高頻段存在一定挑戰。

關鍵字：餘響時間、背景噪音、建築構造隔音性能、住宅空間聲場

A05

Objective physical assessment of indoor sound fields in residential spaces

Abstract

The motivation for this research is the importance of living environment quality, especially in noise control and audiovisual spaces. The study uses measured data to compare actual values with estimates from computer simulations and formulas. Results show that interior decoration and sound-absorbing materials help achieve desired reverberation times. Sound insulation performance indicates the main door excels in low frequencies but has challenges in mid to high frequencies.

Keywords: Reverberation time, background noise, building structure sound insulation performance, residential space acoustic field.

A06

貓旅館機械通風之可行性的探討

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摘要

在幾百年前就存在著「寵物」一詞，農業時期人類飼養寵物只是為了畜牧、協助捕捉老鼠。隨著如今的社會，寵物地位提升，一開始是看門的經濟效益，昇華到對於毛小孩的照顧及依附心理、將寵物視為自己的孩子般疼愛有加，在疫情後的旅遊潮，提升了對寵物旅館的需求。而本研究針對寵物旅館機械通風設備進行探討，長期使用機械通風(空調系統)，使空氣長期滯留於空間中，無法達到通風換氣的效果，若長期不注意通風換氣的問題，稍有不慎將會影響貓咪及業主的身體，經由文獻探討、案例分析的蒐集，使民眾更了解寵物貓旅館內的室內氣流對貓咪及人類引發慢性疾病身體不適的影響。

關鍵詞：機械通風、寵物旅館、通風換氣

A06

Study on the Impact of Ventilation Design on Indoor Thermal Environment in Cat Hotels

Abstract

The term "pet" has existed for centuries. During the agricultural era, humans kept pets primarily for livestock purposes and to help catch mice. In modern society, the status of pets has risen. Initially, pets were kept for their economic benefits, such as guarding homes. This has evolved into a deep emotional attachment, where pets are cared for and loved as if they were one's own children. The post-pandemic travel boom has increased the demand for pet hotels. This study explores the mechanical ventilation equipment in pet hotels. Long-term use of mechanical ventilation (air conditioning systems) causes air to remain stagnant in the space, failing to achieve effective ventilation. If ventilation issues are not addressed over time, it can negatively affect the health of both cats and their owners. Through literature review and case analysis, we aim to better understand the impact of indoor airflow in cat hotels on both cats and humans.

A07

座位型態對於開放式辦公室聲學規劃之初探

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摘要

20世紀中期開始，開放式辦公室設計因其能夠促進員工之間的互動和合作而受到廣泛推崇。大型企業如Google、Facebook等大型企業廣泛應用。然而，隨著這一設計的普及，許多研究指出開放式辦公室存在的聲音干擾問題，這不僅影響員工的工作效率，還增加了壓力和疲勞感。本研究旨在通過改善開放式辦公空間的聲場規劃，實現以下目標：1、增加語音清晰度　2、聲場區域性集中　3、不相互干擾。作為初步探討，本研究通過文獻回顧和理論分析，評估不同座位排列和吸音材料對聲場的影響。預計結果顯示，合理的座位排列和吸音材料的使用能顯著提高語音清晰度和聲場集中性，並減少干擾。

關鍵詞：開放式辦公室、語音清晰度、聲音干擾、聲場規劃、聲場集中

A07

A preliminary study on the acoustic plan of open office with seating arrangement

Abstract

Since the mid-20th century, open-plan office designs have been widely praised for their ability to enhance interaction and collaboration among employees. Major corporations like Google and Facebook have extensively adopted this design. However, with the rise in popularity, many studies have highlighted the sound interference issues inherent in open-plan offices, which not only affect employee productivity but also increase stress and fatigue. This study aims to improve the acoustic planning of open-plan office spaces with the following objectives: 1. Increase speech intelligibility 2. Concentrate sound fields regionally 3. Minimize interference. As a preliminary exploration, this research will evaluate the impact of different seating arrangements and sound-absorbing materials on the sound field through literature review and theoretical analysis. The anticipated results suggest that appropriate seating arrangements and the use of sound-absorbing materials can significantly improve speech intelligibility and sound field concentration while reducing interference.

Keywords: Open-plan offices, Speech intelligibility, Noise interference, Sound field planning, Sound field concentration

A08

歷史園區之聲景環境研究-以台中霧峰林家古厝街區為例-

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摘要

在城市生活中扮演著日益重要的角色，且其空間特性明顯有別於其他類型的城市開放空間 ，其環境的營造對於豐富都市生活體驗、展現地域特色與城市形象、方便居 民生活來說均具重要意義。透過分析具有歷史保存環境空間下，對建築和環境設計提供了實際應用價值，有助於設計更能改善使用者體驗的空間，聲景、滿意度與知覺三者之間的關係，聲景（Soundscape）是指人們對周圍聲音環境的感知和體驗。在歷史園區中，自然聲音（如鳥鳴、水聲）和人文聲音（如音樂、文化活動）可以提升環境的舒適度和吸引力。優質的聲景和環境設計可以提升訪客和居民的滿意度，而通過聲景設計可以引導人們對環境的正向知覺，增強對歷史文化的理解和認同。

關鍵詞：歷史園區、音景模擬、空間感知、聲音景觀

A08

Study of Soundscape Environment in Historical Parks -Taking Taichung Wufeng Lin Family Garden as an example-

Abstract

In urban life, historical parks play an increasingly important role, with their spatial characteristics distinctly different from other types of urban open spaces. The creation of their environment is crucial for enriching urban living experiences, showcasing regional characteristics and city image, and facilitating residents' daily lives. By analyzing spaces with historical preservation, practical application value is provided to architecture and environmental design, aiding in the creation of spaces that better improve user experiences. The relationship between soundscape, satisfaction, and perception is significant. A soundscape refers to people's perception and experience of the surrounding sound environment. In historical parks, natural sounds (such as birdsong and water sounds) and cultural sounds (such as music and cultural activities) can enhance the comfort and appeal of the environment.

High-quality soundscapes and environmental design can increase the satisfaction of visitors and residents. Through soundscape design, we can guide people's positive perception of the environment, enhancing their understanding and recognition of historical culture.

A09

應用專案管理探討臺中市公園遊具設施之研究

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摘要

臺中市政府推動美樂地計劃改善公園內老舊遊具設施政策，遊具設施必須通過公共兒童遊戲場設備法規方可開放使用，但遊戲場設置之安全性及相關法規越來越嚴謹，遊具不易通過檢測，故針對立德公園及麗園公園內遊具設施導入專案管理思維，透過五大流程建立研究流圖、利害關係人分析，最後以系統思考及魚骨頭分析呈現因果關係，提出改善遊具設施方式。1.麗園公園老舊遊戲設施不合格部分有幼兒頭頸部誘陷(3/7)處及安全距離不夠(5/8)處的問題，檢測15處有8處不合格地方(約佔53%)。2.遊戲場鋪面改為鬆填式鋪面材料(沙子或小石子)提倡材料永續環保的概念。

關鍵詞：遊具設施、共融遊戲場、專案管理

A09

A Study on the Application of Project Management for Public Park Playground Facilities in Taichung City

Abstract

The Taichung City Government promotes the Melody Plan to improve the policy of old playground facilities in parks. Play facilities must pass the regulations on public children's playground equipment before they can be opened for use. However, the safety and related regulations of playground settings are becoming more and more stringent. It is not easy for the equipment to pass the test, so project management thinking was introduced for the recreational equipment facilities in Lide Park and Liyuan Park. Through five major processes, a research flow chart was established, stakeholder analysis was conducted, and finally causal relationships were presented using systems thinking and fish bone analysis, and it was proposed Improve the form of recreational facilities. 1. The unqualified parts of the old play facilities in Liyuan Park include problems with children’s heads and necks being trapped (3/7) and insufficient safety distances (5/8). 8 out of 15 areas were found to be unqualified (53%). 2. The playground paving is changed to loose-fill paving material (sand or pebbles) to promote the concept of sustainable and environmentally friendly materials.

Keywords: Playground equipment, Inclusive playground, Project management

A10

應用專案管理探討公共工程建築生命週期之研究

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摘要

建築生命週期中，包含了從初始概念構思(概念構思與規劃、設計、招標、施工、運營與維護)到其拆除或再利用的全過程，本文係從新建期之前三個階段：「設計/發包/施工」，針對各階段之議題進行探討，並結合專案管理手法以達成「如期、如質」之目標。在設計規劃中，針對使用者需求、結合模組化設計，提供250人使用之施工處辦公室RC造/F4B1，提供150人使用之單身備勤宿舍F7B2/RC造。以「最有利標」招標方式辦理合併招標、擴大規模，預估可減省約30%之文書作業量，並針對監造期間可能遭遇問題探析，藉由構件預鑄化：以整體衛浴取代傳統工法，預估可減省約70%裝修工期，建築物外牆採塗料取代磁磚施工，約可減省約50%作業時間與現場作業缺工需求，透過以上研析探討預先防範問題、提早規劃因應為本研究動機。

藉由前述三個面向，考量如何有效將營造工程中的風險進行控管，透過文獻分析、實務操作及導入專案管理的五大流程及「系統思考」因應，期能有助於規劃、執行、監控和成功完成施工項目，提高查核效率，結合循環經濟，探討分析本案建築生命週期新建期各階段問題之解決方式，以達成實際執行工程預期之工期管控與品質管制目標。

關鍵詞：建築生命週期、最有利標、專案管理、系統思考

A10

A Study on Applying Project Management to Explore the Lifecycle of Public Engineering Construction.

Abstract

The building life cycle encompasses the entire process from initial concept (conceptualization and planning, design, bidding, construction, operation, and maintenance) to its demolition or reuse. This article focuses on the first three stages before the new construction period: design, bidding, and construction. It explores issues at each stage and incorporates project management techniques to achieve the objectives of "on time and on quality."In the design and planning phase, user needs were addressed by incorporating modular design. An RC-constructed office (F4B1) for 250 people and a single-occupancy dormitory (F7B2/RC) for 150 people were provided. The project was tendered using the "most advantageous tender" method, combining bids and expanding the scale to reduce documentation by an estimated 30%. Potential issues during supervision were analyzed, and prefabricated components were employed: replacing traditional methods with integrated bathrooms is expected to reduce renovation time by approximately 70%, while using paint instead of tiles for exterior walls is anticipated to cut operation time and on-site labor demands by around 50%. This study aims to preemptively address issues and plan responses through these analyses.

Through the aforementioned three aspects, considerations are made on effectively managing risks in construction projects. By conducting literature analysis, practical operations, and incorporating the five processes of project management along with 'Systemic consideration', efforts are made to assist in planning, execution, monitoring, and successful completion of construction projects. This aims to enhance audit efficiency, integrate principles of circular economy, and analyze solutions to issues at each stage of the new construction phase in the building's lifecycle to achieve the expected project schedule control and quality management goals in the actual execution of the project.

Keywords: Construction Lifecycle, the most advantageous tender, Systemic consideration, project management.

B01

醫療院所能源管理系統之探討-以台中某醫學中心之照明為例

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摘要

醫學中心的系統設備持續升級，為符合政府節能減碳政策，必須深入瞭解能源消耗情況，進行評估並制定節能對策與分析能源消耗指標為達到此目標，並依據全國非生產性質行業能源查核年報調查表5年(2017年至2021年)平均年總用電度數能源耗電指標，進行比較與分析。研究結果顯示：空調設備的平均用電佔比最高達54.75%，其次為照明設備的平均用電佔比為15.28%。近年來，醫學中心已逐步推行替換T5燈具，並引入LED照明設備，實施照明節能設備更換計畫。這些舉措節省約42,819度電，相當於照明總用電量的1.84%，同時提高照明效能，實現明顯的節能成效。

關鍵詞：醫學中心、能源管理、節能政策、LED照明設備

B01

Discussion On Energy Management Systems In Medical Institutions

Abstract

The system equipment of the medical center continues to be upgraded. In order to comply with the government's energy conservation and carbon reduction policies, it is necessary to have an in-depth understanding of energy consumption, evaluate and formulate energy conservation countermeasures and analyze energy consumption indicators to achieve this goal, and based on the national non-production industry energy audit annual report survey Table 5 (2017 to 2021) average annual total electricity consumption energy consumption indicators for comparison and analysis. The research results show that the average electricity consumption of air-conditioning equipment accounts for up to 54.75%, followed by the average electricity consumption of lighting equipment, which accounts for 15.28%. In recent years, the medical center has gradually replaced T5 lamps, introduced LED lighting equipment, and implemented a lighting energy-saving equipment replacement plan. These measures saved approximately 42,819 kilowatt-hours of electricity, equivalent to 1.84% of the total lighting electricity consumption, while improving lighting efficiency and achieving significant energy-saving results.

Keywords: Medical center, energy management, energy saving policy, LED lighting equipment

B02

青年參與農村輔導導入專案管理之探討-以徵件計畫為例

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摘要

鼓勵青年參與苗栗縣農村社區發展相關議題，以自身專長提出解決農村問題之創意點子，建立在地青年對於農村生產、生活、生態等面向的自主參與，延續農村再生由下而上的共同參與的精神，並藉由競賽網羅各類型優質青年。

研究結果顯示：首度辦理集制定獎勵競賽規則，並辦理 3 場徵件說明會及 2 場提案工作坊，吸引超過 100 人次青年參與，並藉由工作坊輔導 11 件計畫參與競賽，共計 34 件參與，26 件(76%)進入複審。透過專案管理可以協助看得更全面，減少及避免惡性循環，使計畫執行更順暢及更具有效益。

關鍵詞：農村再生、農村青年、青年輔導、青年競賽

B02

Abstract

Encourage youth to participate in issues related to the development of rural communities in Miaoli County, Propose creative ideas to solve rural problems with their own expertise, establish local youth's independent participation in rural production, life, ecology, etc. Continue the bottom-up spirit of joint participation in rural regeneration and recruit various types of high-quality young people through competitions.

research shows: for the first time, we formulated the rules of the award competition, and conducted 3 briefing sessions and 2 proposal workshops, attracting more than 100 young people to participate, and participated in the competition through workshop guidance on 11 projects, a total of 34 26 casesentered review. Through project management, project execution can be made smoother and more effective.

Keywords: rural regeneration, rural youth, youth mentoring, youth competition

B03

以高解析熱指數資料推估氣候變遷下都市戶外工作者之熱壓力衝擊及調適策略研究

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摘要

自工業革命起，逐年上升的氣溫已證明了氣候變遷的事實。面對全球的溫度變化，又以高度開發的都市中心，因熱島效應使得升溫更為劇烈，且除了大量的居住人口外，需承受高曝曬的營建產業與戶外工作者也多集中於此。本研究以臺灣氣候變遷推估資訊與調適知識平台計畫（TCCIP）所建置的HiRAM全球暖化程度資料為基礎，結合我國職安署《高氣溫戶外作業勞工熱危害預防指引》中採用的「熱指數（Heat index）」作為戶外工作者之熱舒適指標，並以2012年美國國家職業安全衛生研究所（NIOSH）「勞工暴露風險等級」標準進行分級，推算未來氣候變遷下，營建業勞工、戶外工作者等所需承受的熱壓力等級與調適缺口。統計平均7月14:00時，全臺出現熱指數達第三級（High）之面積佔比分別為：基期尚未出現、升溫2°C情境佔1.03%、升溫4°C情境佔37.85%。透過了解戶外高溫所造成的舒適度困境，以及推算夏季逐時之熱壓力強度，雇主可以此為參考依據，以保障勞工之安全衛生作業條件，提升熱舒適度，降低意外發生機率。

關鍵詞：都市熱島、熱指數、職業安全衛生、戶外工作者

B03

Assessing and studying the heat stress and adaptation strategies for outdoor workers based on the downscaled heat index data

Abstract

Since industrial revolution, the global ambient temperature has continued to rise and reflected the trend of climate change. Of all land surfaces impacted by the temperature change, highly developed urban areas were influenced the most due to the urban heat island effect. In addition to the large number of people taking residence, these areas are also where densely populated construction and outdoor workers exposed to high levels of sun exposure can be found. This study mapped the potential heat stress the out-of-door workers sustained based on the HiRAM (High Resolution Atmospheric Model) global warming level data constructed by the Taiwan Climate Change Information and Adaptation Knowledge Platform Project (TCCIP), using the Heat index (HI) adopted by Taiwan Occupational Safety and Health Administration as the heat alert index in the "Guidelines for Prevention of Heat Stress for Laborers in High-Ambient Temperature Outdoor Operations" and the HI-based heat stress-ranking system proposed by the US National Institute for Occupational Safety and Health in 2012, and evaluated the excess heat stress that construction industry and outdoor workers will have to adapt to under the current scheme of climate change. On the average of July 14:00, the percentage of Taiwan's land surface where the HI reached Level 3 (High) was 0% in the base period, 1.03% under the scenario of GWL+2°C, and 37.85% under GWL+4°C. With the insights on the difficulty maintaining thermal comfort due to outdoor heat exposure and on the heat stress intensified in the summer, the employers may use the results from this study as a reference for devising strategies of adaptation to promote occupational safety and health for outdoor workers, to improve thermal comfort, and to reduce risk of accidents.

Keywords: urban heat island, heat index, occupational safety and health, outdoor workers

B04

屋頂型太陽能光電板配置對都市風熱環境影響之研究

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摘要

再生能源被視為能緩解氣候變遷並解決能源危機的關鍵。屋頂型太陽能光電板因其不佔用土地資源，在高密度都市中逐漸成為主流。現有研究對在建築密集區大規模安裝太陽能光電板對都市風熱環境的影響探討仍不充分。本研究以3*3理想城市模型，分析三種不同屋頂型太陽能光電板配置方式（集中、兩側、均勻），針對不同配置方式探討對都市溫度及熱舒適度的影響。研究結果顯示，不架高情況下，建議採兩側分布的架設方式對降低環境溫度和提升整體散熱效果上可達到最佳平衡。

關鍵詞：太陽能光電板、再生能源、配置型態、微氣候、CFD流體力學

B04

A Study on the Influence of Rooftop Solar Photovoltaic Panel Configuration on Urban Wind and Thermal Environments

Abstract

Renewable energy is seen as crucial for mitigating climate change and addressing the energy crisis. Rooftop solar photovoltaic panels, which do not occupy land resources, are increasingly becoming mainstream in high-density urban areas. However, existing research on the large-scale installation of these panels in densely built environments and their impact on urban thermal and airflow conditions is still insufficient. This study uses a 3*3 ideal city model to analyze three different rooftop solar photovoltaic panel configurations (centralized, side-distributed, and evenly distributed), examining their effects on urban temperature and thermal comfort. The results indicate that, without elevation, the side-distributed configuration achieves the best balance in reducing environmental temperature and enhancing overall heat dissipation. Therefore, it is recommended to adopt the side-distributed setup for installing rooftop solar panels.

Keywords: Solar Photovoltaic,Renewable Energy,Configurations,Microclimate,CFD

B05

課間停留空間之設備與光環境因子對使用者行為之研究-以逢甲大學行政一館為例

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摘要

近年來，由中央到地方皆致力於校園建築空間美學的推廣，以建構良好的學習環境。逢甲大學在活化既有校園空間上，有效規劃閒置空間用於課間停留的建置，為舊大樓注入新生命，讓師生於課間能多元使用學習資源。而良好的建築空間中光是必不可缺的構成要素，其所形成的視覺、生理、心理環境，對人體將帶來極大的影響，因此本研究將對逢甲大學已完工之課間停留空間作為研究對象，以觀察法分析此光環境因子對使用者行為之影響及光環境之舒適度，以提供未來建置之參考。

關鍵詞：課間停留空間、光環境、校園空間、空間美學、環境行為

B05

Research on the impact of light environment factors on user behavior in the Social Interaction Space in Feng Chia University

Abstract

In recent years, both the central and local governments have been committed to promoting the aesthetics of campus architectural space to create a good learning environment. In revitalizing the existing campus space, Feng Chia University has effectively planned idle space for Social Interaction, injecting new life into the old building and allowing teachers and students to use learning resources in a variety of ways during class breaks. Light is an indispensable element in a good architectural space, and the visual, physiological, and psychological environment it creates will have a great impact on the human body. Therefore, this study will examine the completed class stay at Fengjia University. Taking space as the research object, we use observation methods to analyze the impact of this light environment factor on user behavior and the comfort of the light environment to provide a reference for future construction.

Keywords: Social Interaction pace, Light Environment, Campus Space, Spatial Aesthetics, Environmental Behavior

B06

基於科技與藝術的創新公園規劃設計-以台南高鐵特區為例

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摘要

近幾年有哲學家提出「藝術家之死」的論點，意旨生活即是藝術，人人都是藝術家。本研究探討藝術品不再只能存在於特定場域，應存在於我們生活周遭的自然場域。藝術之死並非真正的死亡，而是人們重組並探索新的藝術定義。本研究範圍為台南高鐵站周邊區域，試圖將藝術帶入這個場域，使大眾能更認識、體驗以及創作藝術，在此場域互相交流、玩樂。這也提供了藝術家創作、互動、分享的舞台，藉由自然的生活場域，促使社會重新定義何謂藝術。本研究預期規劃為開放式的自然、藝術及科技相互共存的場域，並思考未來藝術性質場域的特性，將未來科技的互動模式融入規劃設計中，以提供未來規劃設計參考。

關鍵詞：科技與藝術、展覽互動空間、公園規劃

B06

Innovative Park Planning and Design Based on Technology and Art: A Case Study of Tainan High-Speed Rail District

Abstract

In recent years, some philosophers have proposed the concept of the "death of the artist," suggesting that life itself is art and everyone is an artist. This study explores the idea that artworks should no longer be confined to specific venues but should exist in the natural settings of our everyday lives. The "death of art" is not a literal death but a reorganization and exploration of a new definition of art.This study focuses on the area surrounding Tainan High-Speed Rail Station, attempting to integrate art into this space, allowing the public to better understand, experience, and create art. This setting provides a stage for artists to create, interact, and share, using the natural living environment to encourage society to redefine what art is. The anticipated plan is an open space where nature, art, and technology coexist. It considers the characteristics of future art spaces and incorporates future technological interaction models into the planning and design, providing a reference for future planning and design.

Keywords: Technology and Art, Exhibition Interaction Space, Park Planning

B07

道路綠化結構對都市溫熱環境與通風之影響研究

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摘要

各國努力在維持社會發展下，尋求各種生態策略以減少都市化所產生的環境問題。行道樹作為調解微氣候的重要因子之一，樹木的配置方式影響了自身在都市中的通風效果及降溫效益。本研究依照臺北市中心常見的道路尺度及建築形態，利用ANSYS Fluent v18以低樓層建築(25m/4f)與高樓層建築(40m/12f)作為兩種理想城市模型進行數值模擬分析。透過不同排列數的行道樹植被結構(兩排喬灌木、三排喬灌木)，探討行道樹配置對都市風熱環境的影響。研究結果:溫熱環境而言，低樓層建築種植三排喬灌木對迎風面較佳、種植兩排喬灌木對背風面較佳;高樓層建築兩排喬灌木對迎風面及背風面皆較佳。風環境而言，低樓層建築及高樓層建築種植兩排喬灌木對迎風面及背風面皆較佳。

關鍵詞：都市十字路口、行道樹、街道綠化、微氣候

B07

The Impact of Road Greening structure on Urban Thermal Environment and Ventilation

Abstract

Countries strive to pursue various ecological strategies to reduce the environmental problems caused by urbanization while maintaining social development. As one of the important factors regulating microclimate, the arrangement of street trees affects their own ventilation effect and cooling efficiency in the city. This study uses ANSYS Fluent v18 to conduct numerical simulation analysis using low-rise buildings (25m/4f) and high-rise buildings (40m/12f) as two ideal city models based on the common road scales and building type in Taipei City. Through four sets of street trees with different rows of street trees (two rows of arbor trees and shrubs, and three rows of arbor trees and shrubs).The influence of street tree configuration on the urban wind and heat environment was explored. The results of the study showed on the lower floors, it is better to plant three rows of arbor trees and shrubs on the windward side and two rows of arbor trees and shrubs on the leeward side;on the upper floors, two rows of arbor trees and shrubs are planted on both the windward and leeward sides.

Keywords: Urban intersections, street trees, street greening, microclimate

B08

透天住房的開口窗型在自然通風條件對室內風環境影響-以台中市大里區個案為例

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摘要

為了解如何可有效增加自然通風之室內通風品質，因此規劃一系列的建案實例的風場模擬分析，也為建築業要實現ESG永續發展目標路徑努力，其關鍵在於使用者在室內感到舒適，同時減少能源使用。

本研究使用數位流體力學CFD可信度高的數值模擬方法，對台中市大里區的一個透天住家新案進行分析。考慮了基地環境的風向、建築物的縱深以及相鄰建築物的風壓等因素。研究旨在探討外推窗的開窗角度和方向對室內通風環境的影響。研究的目的是優化室內通風設計，以減少能源使用。分析結果顯示，相鄰南側為12樓建築物較會形成大樓風壓產生紊流風。外推窗的設置需考量季節而調整不同的方向和角度。建議在建築物正立面的東側設置外推窗，並在全年的大部分時間內將其開啟角度設定為左開最大值90度，當環境風速為11m/s，因導風效果之故，室內的風速預估達到3 m/s以上，可有效增加室內通風量與品質。

關鍵詞：開口窗型、自然通風、室內風環境、數位流體力學

B08

The impact of the opening window type of a townhouse on indoor wind environment under natural ventilation conditions - A case study in Dali District, Taichung City.

Abstract

In order to understand how to effectively enhance indoor air quality through natural ventilation, a series of case studies were planned for wind field simulation analysis. This effort is also crucial for the construction industry's pursuit of ESG sustainable development goals, with the key objective of ensuring user comfort indoors while reducing energy consumption.

This study utilizes a highly reliable computational fluid dynamics (CFD) numerical simulation method to analyze a new row house project in Dali District, Taichung City. Factors such as wind direction in the site environment, building depth, and neighboring building wind pressures are considered. The aim of the study is to investigate the impact of the opening angle and direction of outward-opening windows on the indoor ventilation environment. The objective of the research is to optimize indoor ventilation design to reduce energy consumption.

The analysis results show that neighboring 12-story buildings on the south side tend to create turbulent winds due to building wind pressures. The placement of outward-opening windows needs to be adjusted according to the seasons, considering different directions and angles. It is recommended to install outward-opening windows on the east facade of the building and set the opening angle to the maximum value of 90 degrees for most of the year. When the environmental wind speed is 11 m/s, the estimated indoor wind speed reaches above 3 m/s due to the wind-guiding effect, effectively increasing indoor ventilation rate and quality.

Keywords: Opening-window types, natural ventilation, indoor wind environment, CFD

B09

住商大樓友善環境之研究-以 HI 為例

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摘要

近年來隨著高齡化人口增長、都市土地的高度使用，住商大樓有逐漸增加的趨勢，國家越來越重視無障礙空間，對於公共建築物取得使用執照前，必須通過『建築物無障礙設施設備規範』勘檢作業，但勘檢人員時常忽略集合住宅無障礙空間(室外項目、室內項目、友善設施)設計，設置『通路及停車空間』內容、位置、標誌之正確性，故針對嘉義縣太林鎮 HI 住宅，透過文獻回顧分析，及拍照、記錄、分析等，進行比較分析與改善等作業。

研究結果顯示：一、避難層坡道及扶手錯誤分析：室外通路避難層未設置引導標誌，得分為-2分。二、停車空間錯誤分析：未設置長：600公分，寬：550公分相鄰無障礙，不符合，得分為-12分。

關鍵詞：住商大樓、集合住宅、無障礙空間、友善環境

B09

Research on Environmentally Friendly Residential and Commercial Buildings - HI as an Example

Abstract

In recent years, with the growth of the aging population and the intensive use of urban land, there has been a gradual increase in residential and commercial buildings. The country has paid more and more attention to barrier-free spaces. Before obtaining a license for public buildings, they must pass the "Building Accessibility Facilities and Equipment" "Standards" inspection operations, but inspection personnel often overlook the design of barrier-free spaces (outdoor projects, indoor projects, friendly facilities) in residential buildings, and the correctness of the content, location, and signs of "access roads and parking spaces", so Taipei County, Chiayi County For Linzhen HI housing, we conducted comparative analysis and improvement through literature review and analysis, photography, recording, analysis, etc.

The research results show: 1. Error analysis of ramps and handrails on the refuge floor: There are no guidance signs on the refuge floor of the outdoor access, and the score is -2 points. 2. Parking space error analysis: Length: 600 cm, width: 550 cm are not set. Adjacent and barrier-free, it does not meet the requirements and the score is -12 points.

Keywords: Residential and Commercial Buildings, Collective Housing, Barrier-free space, Friendly environment.

B10

運用 CFD 探討嗅覺與空間關係之研究-以台南安平區域為例

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摘要

生活中人們接收訊息的方式通常來自於五感，嗅覺在人體感官中帶有探索以及記憶的能力。本研究藉由氣味與氣流的關係探討地區的文化遺產。

本次設計成果運用嗅覺對人體的影響分為四個項目為感覺、真實、流動以及匯集。感覺與真實氣味為當地既有的活動、文化、產業、綠帶等氣味，配合 CFD 推演出流動與匯集的氣味帶動空間彼此之間的關聯性，並嘗試藉由空間形式，將氣味停留在鼻子上，進而體會到地方文化的嗅覺遺產。

關鍵字:五感體驗、嗅覺記憶、流體力學(CFD)

B10

Utilizing CFD to Explore the Study of Olfactory Perception and Spatial Relationships: A Case Study of the Anping District in Tainan

Abstract

In daily life, people receive information primarily through their five senses, with the sense of smell having the abilities of exploration and memory. This study explores cultural heritage through the relationship between scent and airflow.

The design outcomes of this study categorize the effects of smell on the human body into four aspects: sensation, reality, flow, and convergence. Sensation and reality odors refer to the existing smells of local activities, culture, industries, and green spaces. Using CFD (Computational Fluid Dynamics), the study simulates the flow and convergence of odors to enhance the spatial connections. It also attempts to use spatial forms to retain scents in the nose, thereby experiencing the olfactory heritage of local culture.

Keywords: Five Senses Experience, Olfactory Memory, Computational Fluid Dynamics equipment

B11

太陽能板廢棄物回收現況之初探

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摘要

2025年非核家園到2050淨零碳排目標，政府積極推動太陽能光電的發展，以減少對核能和化石燃料的依賴。光電板的平均壽命為20~25年，目前我國太陽能廢棄物在2023年後有超過1萬公噸預估到2035年，每年將有10萬公噸的廢棄光電板需要處理，這對政府和產業都是一項挑戰。廢棄光電板回收問題日益受到關注,雖然回收的技術有所進步，離零廢棄的目標仍有一段距離。本文利用問卷調查及文獻回顧分析,探討了目前台灣地區所面臨的挑戰1.處理技術再精進2.法規和政策不完善3經濟效益不足4.環保意識不足，四個方面所面臨的挑戰，並提出了相應的改善建議，以期為政策制定者和業界提供參考。

關鍵詞：太陽能光電,綠電,廢棄回收,回收利用。

B11

A preliminary study on the current situation of solar panel waste recycling

Abstract

The government is actively promoting the development of solar photovoltaics to reduce dependence on nuclear energy and fossil fuels. The average lifespan of photovoltaic panels is 20 to 25 years. Currently, there will be more than 10,000 metric tons of solar waste in China after 2023. It is estimated that by 2035, 100,000 metric tons of waste photovoltaic panels will need to be processed every year, which is of great significance to the government and industry. is a challenge. The issue of recycling waste photovoltaic panels has attracted increasing attention. Although recycling technology has improved, there is still a long way to go before the goal of zero waste. This article uses questionnaire survey and literature review analysis to explore the challenges currently faced by Taiwan in four aspects: 1. Improvement of treatment technology 2. Imperfect regulations and policies 3. Insufficient economic benefits 4. Insufficient environmental awareness Corresponding improvement suggestions are put forward to provide reference for policymakers and the industry.

Keywords: solar photovoltaic, green electricity, waste recycling, recycling.

C01

地震中廟宇防災逃生避難之研究－以樂成宮廟宇為例

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摘要

台灣處於歐亞及菲律賓海板塊之中，屬於地震帶，地震活動頻繁，經常造成建築物損，因此地震災害發生後的應變措施是非常重要的。除了避難設施與設備的完備外，更需依照明確的緊急應變作業處理程序及標準評估的系統來執行；事先規劃並演練避難設施與設備的運作，可以將災害降到最低。另外，這類設施與設備往往也是災難發生後，災民用以避難、暫居的主要依賴工具，故必須有完善的應變措施，除了在減輕損失之餘，並可避免災難在時間及空間上造成持續的傷害，使救災及後續工作能正常進行，達到減災的目的。

關鍵詞：災害、緊急應變、防災措施、逃生計畫

C01

Study on the disaster prevention and evacuation in temples during earthquakes - illustrated by Lecheng Temple

Abstract

Due to the frequent earthquakes in Taiwan, it's essential to conduct prevention and evacuation during an earthquake disaster. According to the above, the strategies must include implementing the prevention equipment, the exact process of emergency operation, and the standard of evaluation systems. The disaster might have decreased as the prevention and evacuation planning were prepared before the earthquake. To achieve the goal of mitigation, the normalization of relief work and prevention of continuous damage should be valued.

Keywords: Earthquake, prevention equipment, emergency operation, evaluation systems.

C02

建築結構模組化之碳排計算初步研究

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摘要

我們現今居住的環境，因為溫室效應的因素，使得氣候溫度逐漸上升。營造業在興建各類建築的過程當中，產生大量的二氧化碳及廢棄物，對環境產生巨大影響。本文透過在建築物設計階段比較傳統工法及結構部分採取模組化工法設計，並運用可拆卸之結構構件設計，並導入建築物生命循環週期之概念，來分析不同的工法在生命週期循環架構下二氧化碳排量，使建築物設計者在興建的構思設計過程到建築物生命終了，能夠選擇低碳興建的工法，在面對環境永續議題上能有更佳的減碳效益。

關鍵詞：循環經濟、模組化工法、可拆卸設計

C02

Preliminary analysis of modular carbon emission calculation of building structure

Abstract

The environment we live in today is gradually rising in temperature due to the greenhouse effect. The construction industry generates a large amount of carbon dioxide and waste in the process of building various types of buildings, which has a huge impact on the environment. This paper analyzes the carbon dioxide emissions of different construction methods under the life cycle structure by comparing the traditional construction methods and the modular construction method design of the structural part in the building design stage, using the design of detachable structural components, and introducing the concept of the life cycle of the building, so that the building designer can choose the low-carbon construction method from the conception and design process of the building to the end of the life of the building, and can have better carbon reduction benefits in the face of environmental sustainability issues.

Keywords: Circular economy、Modular construction method、Detachable design

C03

BIM 應用於機電系統工序檢討實務之研究

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摘要

本研究應用建築資訊模型(Building Information Modeling, BIM)，在施工階段透過BIM技術逐步拆解各道工序，並按步驟組裝講解，以確保施工作業順序的合理性與準確性，這不僅改善傳統圖紙作業模式，還降低了圖面不易發現錯誤的情況。透過建模過程，針對核心和重要施工步驟，建立機械、電氣和管道(Mechanical, electrical, and plumbing, MEP)系統模型，並運用視覺化立體實物展示和圖片成果呈現的方式，解決工程空間概念不易表達之困難，從而減少施工現場因無法真正瞭解施工順序而導致的工序混亂情況。本研究將通過應用實際案例，依照前述的作業模式進行工序檢討，並將檢討過程之成果作為本研究應用之參考依據。

關鍵詞：建築資訊模型(BIM)、MEP、工序模擬、施工階段

C03

The Applications of BIM-based Construction Sequence Review for MEP Systems in Construction

Abstract

This study applies Building Information Modeling (BIM). During the construction stage, BIM technology is used to gradually dismantle each process and assemble and explain it step by step to ensure the rationality and accuracy of the construction operation sequence. This not only improves the traditional The drawing operation mode also reduces the difficulty of finding errors in drawings. Through the modeling process, we establish mechanical, electrical, and plumbing (MEP) system models for core and important construction steps, and use visual three-dimensional physical display and picture results presentation to solve the engineering space concept Difficulties that are difficult to express, thereby reducing process confusion at the construction site caused by the inability to truly understand the construction sequence. This study will conduct a process review based on the aforementioned operating model by applying actual cases, and use the results of the review process as a reference for the application of this study.

Keywords: Building Information Modeling (BIM), MEP systems, construction phase, construction sequence.

C04

用 BIM 解決住宅耗能以 revit 模型應用為例

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摘要

氣候變化對全球氣溫衝擊及極端天氣事件對生態系統造成重大影響。節能減碳已成為全球最熱門的問題，而建築業是全球能源消耗和溫室氣體排放的主要貢獻者之一，因此改善建築的能源效率是應對氣候變化的重要策略。許多國家和組織設定了碳中和目標，即零碳目標，旨在減少溫室氣體排放以實現永續發展。住宅建築作為能源消耗的重要領域，致力於實現碳零對達成這些目標至關重要。隨著BIM技術和能源模擬軟體的進步，應用BIM與Revit進行能源分析變得更加容易和準確。這為研究者提供了研究住宅建築能源效率並達到碳零目標的良好契機。

C05

擴增實境應用於建築工程 BIM 模型檢核之研究

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摘要

於工程施工階段常發生建築資訊模型(Building Information Modeling, BIM)與工程現場不一致、模型於工程現場比對不易、無法迅速回饋模型與現場比對成果等問題，為落實模型與現場一致性、提升模型與現場檢核效益、優化模型與現場檢核成果回饋即時性，更促使BIM應用可更加貼近於工程實務面，透過導入新興技術擴增實境(Augmented Reality, AR)，讓工程人員使用平板電腦或行動裝置，將BIM虛擬模型「套入」於工程現況當中，有效改善傳統對於BIM模型與現場檢核，讓工程人員可更直觀的瀏覽模型及發現模型與工程現況之差異，有效改善BIM模型與現場檢核作業，落實BIM模型與現場一致性之目標。

關鍵詞：建築資訊模型、擴增實境、施工階段、BIM模型檢核

C05

Applications of AR for Inspection of BIM Models in Building Projects

Abstract

The BIM models should be accurate to apply different BIM-related applications during the construction phase. Therefore, the onsite engineers or BIM engineers need to inspect BIM models and confirm whether the BIM is accurate or not. However, there are many practical problems and limitations regarding to inspection of BIM models. In order to solve the above problems, the study proposed approach for enhance the inspection for BIM models using Augmented Reality (AR) technology. With the use of AR and mobile devices, the inspection performance can be improved and enhanced at construction sites. The proposed approach was applied to a case study of a building project in Taiwan to verify their effectiveness. Finally, the benefits, limitations, conclusions, are summarized for further applications.

Keywords: Building Information Modeling (BIM), Augmented Reality (AR), Construction phase, BIM Model Inspection

C06

韌性海港漁村規劃設計之研究-以嘉義布袋港為例

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摘要

全球氣候變遷導致海平面上升，本研究探討嘉義布袋海岸淹水潛勢區伴隨著沿海地區地層下陷，導致當地的活動以及土地在未來即將消逝。研究範圍為布袋港口附近歷史悠久的漁市場。研究目標在於思考在淹水潛勢區域，如何保留當地記憶中的活動以及熟悉的土地，思考運用高腳屋以及浮動建築物特性，重新規劃可以適應海平面上升威脅的水上建築物，使居民即使土地被水淹沒，依然可以在熟悉的土地上繼續過去的活動，並且可以至水底觀看過去的海岸聚落的足跡，提出具未來性、在地性的水上建築物，以供未來區域規劃設計參考。

關鍵詞：海平面上升、浮動建築物、文化記憶

C06

Research on Resilient Urban Port Fishing Village Planning and Design: A Case Study of Budai Port in Chiayi

Abstract

Global climate change is causing sea levels to rise. This study examines the flood-prone areas of Chiayi Budai Coast, where land subsidence in coastal areas is leading to the disappearance of local activities and land in the future. The study area focuses on the historically significant fish market near Budai Harbor. The research aims to explore how to preserve the activities and familiar land memories in flood-prone areas. It considers the use of stilt houses and floating buildings to adapt to the threat of rising sea levels. By rethinking water-based architecture, residents can continue their past activities on familiar land even if it becomes submerged. Additionally, they can observe the remnants of past coastal settlements underwater. This study proposes futuristic water-based architectural solutions for future regional planning and design reference.

Keywords: Sea Level Rise, Floating building, Cultural Memory

C07

智慧建築於於都更社宅長期修繕計畫之研究－以新北三重富貴段為例

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摘要

都市更新重劃與住宅開發，關聯著永續發展和社會福利議題，社會住宅作為政府社會福利政策，目標必須滿足不同居住需求的族群，只租不賣的社會住宅更應該考慮建物完工後的長期影響；在此情形下，智慧建築利用先進的技術，可確保其建築永續性，藉由長期修繕規劃的管理模式，納入智慧建築對於社會住宅的後續使用，使整體運作能減低成本且更加有效率，以利於永續發展。

本研究以新北市三重區富貴段社會住宅為例，此建案目前正於興建中，整理分析目前現有預定計畫書、服務建議書、維護管理計畫及各界面圖說，透過案例研究分析，將此案智慧建築各系統之施作項目，對於長期修繕項目可持續性影響，進一步分析智慧建築對於提高長期修繕計畫執行效率的因子，以達到社會住宅智慧系統設施後續使用上的永續性。

關鍵詞：都市更新、社會住宅、智慧建築、長期修繕、永續發展

C07

Research on the Application of Intelligent Buildings in Long-term maintenance plans for Urban renewal Social Housing: A Case Study of the Fu-Gui Section in Sanchong, New Taipei City

Abstract

Urban redevelopment and residential development are closely linked to sustainable development and social welfare issues. Social housing, as a part of the government's social welfare policy, aims to meet the diverse housing needs of different groups. Given that social housing is intended for rental only and not for sale, it is crucial to consider the long-term impact of the buildings after completion. In this context, intelligent buildings, utilizing advanced technologies, can ensure the sustainability of the structures. By incorporating a management model for long-term maintenance planning, the application of smart building technologies in social housing can enhance subsequent usage, reducing overall costs and increasing operational efficiency. This will help move towards sustainability.

This study takes the social housing in Fugui Section, Sanchong District, New Taipei City as an example. This building project is currently under construction. Compiled and analyzed the current scheduled project plans, design requirements plans, maintenance management plans and various drawing descriptions. Through case study analysis method. For the impact of the implementation of various systems in this intelligent building on the sustainability of the long-term maintenance project. Further analysis of the factors that intelligent buildings can play in improving the efficiency of long-term maintenance plan execution. To achieve the sustainability of subsequent use of social housing intelligent system facilities.

Keywords: Urban Renewal, Social Housing, Intelligent Building, Long-term Maintenance, Sustainability

C08

大都會區最有利區域開發之指標因素分析及研究-以台中市區域開發為例

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摘要

近期缺工、缺料問題日益嚴重，勞動力減少加上基本工資不斷調漲以及物價通膨的影響，其導致各行各業的成本持續上升，尤其衝擊房市甚多，台灣的房市升溫，官方也不斷推出打炒房政策，在此情況下房價上漲的速度民眾強烈有感，台灣房市雖然碰到疫情、房地合一稅 2.0、實價登錄 2.0 以及央行打防政策等政策變動，但房市在目前的環境下依舊維持上漲的走勢，依據不動產資訊平台數據顯示，2023 年第四季，全國房價所得比為 9.97 倍，台中市為 11.74 倍，僅次於雙北而已，由此發現，即使官方不斷更改政策，但還是無法抑制房價上漲的腳步。從稅制面、資金面等諸多問題將會反應至開發商的成本上，也造就土地及房價降不下來的窘境，不論是店鋪、租屋族甚至購屋族，都會造成龐大的壓力，導致供給與需求雙方呈現不平衡的狀態。因此，建商在這艱難的環境中，勢必要發展最佳策略，因此，本研究嘗試以如何選擇最有利開發區域使效益最大化，並探討開發重劃區域之相關因素分析，做為有利於建案開發商的重要參考。

C09

生成式 AI 對室內設計的影響-以 Midjourney 與 Stable Diffusion 為例

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摘要

近幾年開始，AI生成的出現橫掃全球，我們一直在探討"室內設計會不會被AI取代"。當然，不止室內設計，許多行業也面臨這個問題，但換個方向思考，如果我們能有效的運用AI的技術，那取代我們的不會是AI，而是會使用AI技術的人。因此，本研究將運用Midjourney與Stable Diffusion針對室內設計的草圖、3D草模帶入進行AI生成的效果比較，生成數據結果由本人實際操作，依據輸入的指令、草模進行多次生成的實驗效果，依據使用效果、操作容易度、與草圖的還原度進行對比。針對未來的研究方向，隨著AI技術的進步，AI生成的工具多樣化，可針對不同類型的生成工具進行操作及對比。

關鍵詞：室內設計、AI生成設計、設計趨勢、空間草模

C09

The impact of generative AI on interior design： Take Midjourney and Stable Diffusion as an example

Abstract

In recent years, the emergence of AI generation has swept the world, and we have been discussing "whether interior design will be replaced by AI." Of course, not only interior design, many industries also face this problem, but if we think about it in another direction, if we can effectively use AI technology, what will replace us will not be AI, but people who can use AI technology. Therefore, this study will use Midjourney and Stable Diffusion to compare the effects of AI generation on interior design sketches and 3D rough models. The generated data results are actually operated by myself, and the experimental results of multiple generations are based on the input instructions and rough models. based on the use effect, ease of operation, and restoration of the sketch. Regarding future research directions, with the advancement of AI technology, the tools generated by AI are diversified, and different types of generation tools can be operated and compared.

Keywords: Interior Design, AI Generative Design, Design Trends, Space Rough Models

C10

UAV 應用於工程進度追蹤管理實務應用之研究

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摘要

營建管理中進度控管是工程如期完工的主要關鍵，目前現場拍攝照片影像是普遍傳遞工程現況之方式，惟倚靠人為技術在拍攝角度及高度上皆有所限制，無法全方面了解工程現場實際狀況，而公共工程合約規定提送之綱要進度表，僅要求承包商每月更新後提送紙本，然經多單位層層審核，往往已錯失判斷工程進度的最佳時機。本研究欲使用雲端平台內的線上進度表，結合無人飛行載具機，安全且有效的拍攝多視角工程照片，並即時同步更新至網路共用存取伺服器內實際進度表之對應影像，本研究透過實際案例導入並探討UAV應用於工程進度追蹤管理實務應用的效益及遭遇的問題，作為日後研究與應用之參考。

關鍵詞：無人飛行載具機、施工照片、工程進度管理、雲端網路平台

C10

Applications of UAV for Schedule Progress Tracking and Management in Construction

Abstract

Schedule progress tracking and management is one of the main components in construction management. Currently, site photographs are a common method to track construction schedule for managers. However, there are many limitations to track schedule using photograph in practice at construction sites. Recently, UAV (Unmanned Aerial Vehicle) are applied on different applications in construction industries. To solve the those problems, the study propose the approach using UAV to enhance schedule progress tracking and management at construction sites. Integrated UAV and cloud-based schedule management system, all photograph regarding updated schedule will be captured by UAV and updated in the cloud-based schedule management system for schedule progress tracking. The proposed approach was applied in the selected new building project in Taiwan to verify our proposed approach. Finally, this study proposes conclusion, suggestion, advantages, and facing practical problems through the case study for further practical implementations.

Keywords: Unmanned aerial vehicle, photograph, schedule progress management, Cloud-based platform

C11

應用專案管理探討臺灣營造產業永續發展之研究

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摘要

本研究旨在探討台灣營造產業如何實踐企業永續經營的五個案例，並應用專案管理方法論，提出實施企業永續經營的優化策略。研究結果顯示:案例 A 強調企業社會責任(CSR)，具體措施包括員工子女獎助金每人總計新台幣 85 萬元等。案例 B 和案例 C 專注於企業永續目標(ESG)，案例 B 累計承攬案量達 324 件，案例 C 投資 170 萬建立減碳數據庫。案例 D 及案例 E 在永續發展目標(SDGs)表現突出，案例 D 達成八項 SDGs 指標，案例 E 達成十二項 SDGs 指標。

通過對案例的了解，揭示了臺灣營造產業堆動永續經營的關鍵和挑戰，為強化企業永續經營的實踐，採用專案管理方法，制定明確永續目標等機制，充分彌補實踐中的落差與不足。

關鍵字：營造產業、永續經營、專案管理、CSR、ESG、SDGs

C11

A Study on Applying Project Management to Explore the Sustainable Development of Taiwan's Construction

Abstract

This study aims to explore five cases of how Taiwan's construction industry practices corporate sustainable management, and applies project management methodology to propose optimization strategies for implementing corporate sustainable management. The research results show that Case A emphasizes corporate social responsibility (CSR), and specific measures include scholarships for employees' children totaling NT$850,000 per person. Case B and Case C focus on corporate sustainability goals (ESG). Case B has undertaken a total of 324 cases, and Case C invested 1.7 million to establish a carbon reduction database. Case D and Case E performed outstandingly in the Sustainable Development Goals (SDGs). Case D achieved eight SDGs indicators and Case E achieved 12 SDGs indicators.

Through the understanding of the case, the key and challenges of sustainable management in Taiwan's industrial heap are revealed. In order to strengthen the practice of sustainable management of enterprises, the project management method is adopted, and mechanisms such as clear sustainability goals are formulated to fully make up for the gaps and gaps in practice. insufficient.

Keywords: Industry creation, sustainable management, project management, CSR, ESG, SDGs

D01

台灣營建業看最有利標招標之投標問題初探

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摘要

最近幾年政府採用最有利標的決標方式，以積極推動公共工程建設。最有利標的法源包括:採購法第46條、採購法第47條、採購法第52條、採購法第56條、最有利標評選辦法、最有利標作業手冊。政府推動國內公共工程建設案，採用最有利標為決標模式的目的是在防止低價搶標，讓工程案能決標於較優的廠商，進一步確保工程採購品質。最有利標就是不以價格為唯一考量決標方式。且可以事前訂定所需要的評選項目納入招標文件，滿足採購標案的多構面向的需求與考量，據以挑選最能執行契約的廠商、有效提升工程標的品質、避免廠商低價搶標，惡性競爭。最有利標是讓工程契約關係，建構在品質及價值而非單純的價格關係。本研究主要分析最有利標問題。

關鍵詞：最有利標、營造業、政府採購法

D02

台灣鐵路軌道切換作業之研究

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摘要

於既有鐵路路線進行立體化工程之增建、新建、改建或路線周邊環境優化時，考量路線線型、行車安全、施工困難度、土地徵收及建物拆遷等因素，整建前會將既有運轉路線移至臨時軌，完工後再從臨時軌移至永久軌運轉之兩次軌道切換作業，為確保切換作業及行車運轉安全無虞，鐵道局訂有「工程履勘前置作業自行聯合檢查作業程序」及「鐵路履勘作業程序」做為通車前必要之檢查。通車前軌道切換作業是最後工程作業項目，必須符合鐵道局所訂定「鐵路切換施工標準作業程序」。切換作業包括土建、機電(電力與號誌)及運轉等三大作業，整體整合亦是很重要工作。本研究以實際案例分析，進行路線切換之研究，以期能建構更有效率標準作業程序。

D03

專案計劃最佳化風險分析模式之研究-以發電廠為例

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摘要

專案計畫常因市場經營環境的變化及合約規定的限制，例如 COV19、烏俄戰爭、中美貿易戰爭之影響，導致專案計畫成本超支、營收低於預期營收、資金無法及時到位等的風險狀況，使得專案計畫之實質價值被迫降低，造成投資者需要承擔過多市場違約風險。對國內民間參與國家建設案(PPP)最大融資者之國內聯貸銀行而言，聯貸銀行將受到因操作不當致使機構承受鉅額損失。PPP 案是屬於專案融資（Project Finance），專案融資案計畫複雜度高、計畫期長，不同於一般傳統借貸，銀行所承受風險之可能性及複雜度均變高，因此如何完整且量化的風險分析及管理是專案融資案重要研究課題，亦是本研究主要的目的。

關鍵詞：關鍵財務因子、敏感度分析、情境分析、蒙地卡羅分析、專案融資

D04

缺工時代下模板工程工料剖析之研究

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摘要

缺工問題在營建產業中已存有多年，並隨著少子化問題日趨嚴重，而模板工程又相對需要仰賴更多人力，因此如何精準掌握模板工程材料與勞務變得十分重要。本研究透過問卷訪查後解析其結論重點如下:1. 因缺工嚴重也導致模板估價從業者年齡層51歲以上高達六成，若包含41歲以上則高達九成。2. 勞務費約佔模板工程費用約七成，說明精準掌握人力配置應是模板工程施工時重點。3. 工料剖析方面獲得勞務、材料與雜項工項內容合計14項，提供後續業者估價時更具體之參考。4. 建立模板工程估價預測式精準掌握模板費用，對於達成預定工期目標有絕佳助益。

關鍵詞：模板工程、營建產業、人力短缺

D04

Analysis of Formwork Engineering Costs and Materials in an Era of Labor Shortages

Abstract

The labor shortage in the construction industry has been an ongoing issue for many years, exacerbated by the declining birthrate. Formwork engineering, in particular, relies heavily on manpower. Therefore, accurately managing materials and labor for formwork is crucial. This study, based on a questionnaire survey, highlights the following key points:1. Due to severe labor shortages, 60% of formwork estimators are aged 51 or older, and 90% are aged 41 or older. 2. Labor costs constitute about 70% of the total formwork engineering costs, emphasizing the importance of precise labor allocation. 3. The analysis of labor and materials identified 14 items, including labor, materials, and miscellaneous work, providing detailed references for future estimations. 4. Establishing a predictive model for formwork cost estimation significantly aids in achieving project timeline goals.

Keywords: Formwork Engineering, Construction Industry, Labor Shortages

D05

應用專案管理探討空調維護與保養之研究

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摘要

隨著現代生活水平的提高，空調系統在我們日常生活中及各大場域扮演著舉足輕重的角色。空調系統的有效運作不僅關乎室內舒適度，更直接影響著我們的健康和生活品質。但實務上隨著時間的推移，空調設施的維護保養往往被忽略，可能導致系統效能下降，進而影響室內環境及用戶的健康。本研究首先藉由兩個不同空調需求的案例，應用系統思考分析實際維保施工過程紀錄發現問題所在，並提出空調設備維護保養之順序、人力分配之方案及相關改善方式。研究成果發現：(一)科技廠辦：日籍辦公部門因空氣對流出口面台中市，空氣微塵較高，其維保次數最頻繁為2次/年。(二)應用專案管理於空調維護保養提出解決對策：(1)預防式維護保養取代反應式維護保養。

關鍵詞：空調系統、維護保養、系統思考、專案管理

D05

A Study on the Application of Project Management for Air Conditioning Maintenance

Abstract

With the improvement of modern living standards, air conditioning systems play a pivotal role in our daily lives and in various fields. The effective operation of the air conditioning system is not only related to indoor comfort, but also directly affects our health and quality of life. However, in practice, as time goes by, the maintenance of air-conditioning facilities is often neglected, which may lead to a decrease in system performance, which in turn affects the indoor environment and the health of users. This study first used two cases with different air conditioning needs, applied systems thinking to analyze the actual maintenance and construction process records, discovered the problems, and proposed the order of maintenance of air conditioning equipment, manpower allocation plan and related improvement methods. The research results show that: (1)The Japanese office department faces Taichung City due to air convection outlets and high air dust, so the most frequent maintenance is 2 times/year. (2) Apply project management to propose solutions for air-conditioning maintenance: (1) Preventive maintenance replaces reactive maintenance.

Keywords: Air conditioning system, Maintenance, Systems thinking, Project management

D06

臺 76 線快速公路工程風險評估-以規劃設計為例

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摘要

根據111年的勞動檢查統計年報，107至111年間重大職業災害共1512人，其中營造業人數高達730人，佔總死亡人數的48%。這個數據凸顯了營造業在職業安全方面面臨的嚴重挑戰，也突顯了營建業是一個高風險的行業。為了降低營造業職業災害的發生率，必須緊密結合設計規劃階段的風險評估。

工程規劃設計階段的施工風險評估在降低營造業職業災害發生率方面至關重要。通過積極識規劃設計階段別和解決潛在的安全風險，可以有效提高工地作業環境的安全性和可靠性。過去五年的數據分析顯示，營建業職業傷害千人率由2018年的9.39下降至2022年的7.75，下降了17.4%；死亡千人率從2018年的0.12下降至2022年的0.11，下降了7.1%。

關鍵詞：臺76線公路、營造業職業災害、規劃設計階段、風險評估

D06

Provincial Highway 76 Expressway Project Risk Assessment-Take planning and design as an example

Abstract

According to the 111 annual report on labor inspection statistics, between 107 and 111 years, there were 1,512 major occupational accidents, of which 730 were in the construction industry, accounting for 48% of the total deaths. This data highlights the serious challenges faced by the construction industry in terms of occupational safety, and also highlights that the construction industry is a high-risk industry. In order to reduce the incidence of occupational accidents in the construction industry, it is necessary to closely integrate risk assessment at the design and planning stage.

Construction risk assessment in the planning and design stage of the project is crucial in reducing the incidence of occupational accidents in the construction industry. By actively identifying the planning and design phases and addressing potential safety risks, the safety and reliability of the construction site environment can be effectively improved. Data analysis in the past five years shows that the rate of occupational injuries per 1,000 in the construction industry decreased from 9.39 in 2018 to 7.75 in 2022, a decrease of 17.4%. The death rate per 1,000 decreased from 0.12 in 2018 to 0.11 in 2022, a decrease of 7.1%.

Keywords: Taiwan 76 Line Expressway，Occupational hazards, planning and design stage, risk assessment in the construction industry

D07

應用專案管理探討臺中 4S 汽車展示中心智慧建築之研究

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摘要

本研究透過「臺中4S汽車展示中心」建案為研究案例，並根據2016年版智慧建築評估手冊之內容作為評估基準，並將八項指標拆分為三類群，以應用專案管理於施工階段進行探討，其中使用四種專案管理工具做分析。研究成果發現：

一、專案管理工具能了解工作上的階層與劃分及利害關係人的需求與期望，藉此能在工作流程上更為順利。

二、找出問題原因，其中共提出3項主要原因以及8項次級原因，並針對相關問題原因做分析後，提出16項對策措施來改善或解決問題原因。

三、最後分析設置智慧建築指標相關設備風險評估以利未來能做出更好的決策。

關鍵詞：專案管理、智慧建築、汽車展示中心

D07

A Study on Exploring Intelligent Building of Taichung 4S Automobile Showroom by Applying Project Management

Abstract

This study uses the "Taichung 4S Automobile Showroom" project as a case study and uses the content of the 2016 edition of Evaluation Manual as the evaluation criteria. The eight indicators are divided into three categories to apply project management during the construction phase, using four project management tools for analysis. The research findings are as follows:

1.Using four project management tools to understand the hierarchy and division of work, as well as the needs and expectations of stakeholders, thereby facilitating a smoother workflow.

2.The root causes of problems are identified, with 3 primary reasons and 8 secondary reasons being proposed. After analyzing the relevant causes, 16 countermeasures are suggested to improve or resolve these issues.

3.Finally, conducting risk assessments for the setup of intelligent building related equipment will facilitate better decision-making in the future.

Keywords: Project Management 、Intelligent Building、Automobile Showroom

D08

針對 Stable Diffusion 對室內設計進程之輔助協作應用初探

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摘要

本研究探索了Stable Diffusion技術在室內設計進程中的輔助協作應用。結果顯示，Stable Diffusion在提高設計效率、增強創意表達和促進可持續設計方面極具潛力。該技術能從簡單的文本提示快速生成多種風格且高度逼真的設計圖像，使設計師能夠快速構建和反覆運算設計方案，探索多種設計選項。然而，研究也指出了其在細節的準確性方面的挑戰，需進一步研究優化。總的來說，Stable Diffusion為室內設計提供了一種創新的工具，有望顯著提升設計流程的效率和效果，推動行業技術進步。

關鍵詞：Stable Diffusion、人工智能、室內設計

D08

The Preliminary Exploration of the Application of Stable Diffusion in Assisting Collaborative Processes in Interior Design

Abstract

This study explores the application of Stable Diffusion technology in assisting collaborative processes in interior design. The results show that Stable Diffusion has great potential in improving design efficiency, enhancing creative expression, and promoting sustainable design. This technology can quickly generate various styles of highly realistic design images from simple text prompts, allowing designers to rapidly construct and iterate design schemes, exploring multiple design options. However, the study also highlights challenges in the accuracy of details, requiring further research and optimization. Overall, Stable Diffusion provides an innovative tool for interior design, promising to significantly enhance the efficiency and effectiveness of the design process and advance industry technology.

Keywords: Stable Diffusion、Artificial Intelligence、Interior Design

D09

應用經營管理策略探討 L 公司永續經營之研究

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摘要

本論文研究將從L建設公司創業前期1990~2010從事設計/裝修施工，在成立建設公司後緊接成立藝術中心，L建設於2011~2031開始推出高層建築，營造公司也針對高層建築個案提出創新工法，期許2031~展望未來能永續經營，本文運用SWOT進行個案研究及文獻探討，來分析客戶互動活動及專業團隊客製化變更，長期關注公益、品牌形象，持續增加客戶對L建設公司的信賴與忠誠度。本文研究發現：

一.依L建設公司之SWOT交互因子分析:發現L建設可善用內部專業主管人才優勢，結合優質土地開發商，共同創造個案開發優勢。

二. 立足CSR、胸懷ESG、放眼SDGs：依著SDGs的17項目標逐一檢討並持續推動落實執行，達到企業永續經營目標。

關鍵字：經營管理，永續經營，SWOT

D09

Application of Business Management in Sustainable Operation with A Case Study on L Construction Company

Abstract

This thesis research will focus on the design/decoration construction of L Construction Company from 1990 to 2010, the early stage of its establishment.The art center was established immediately after the establishment of the construction company. L Construction began to launch high-rise buildings from 2011 to 2031. The construction company also proposed innovative construction methods for high-rise building cases. Looking forward to 2031 and looking forward to sustainable operations in the future. This article uses SWOT for case study and literature discussion. To analyze customer interaction activities and customized changes of professional teams. Pay long-term attention to public welfare and brand image, and continue to increase customer trust and loyalty to L Construction Company. The research findings of this article.1.SWOT interactive factor analysis of YL Construction Company (Table 3-2): It was found that L Construction can make good use of its internal professional talents and combine it with high-quality land developers to jointly create case development advantages.2. Based on CSR, with ESG in mind, and looking at SDGs: Based on the 17 goals of SDGs, we will review one by one and continue to promote their implementation to achieve the company's sustainable management goals.

Keywords: Management、Sustainable Business Practices、SWOT

D10

富氫表面修飾複合材料於防火及阻熱塗層之應用

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摘要

隨著現今科技不斷進步，在工業和材料領域上，耐熱性以及防火性塗層在保護材料免受高溫火災損害方面是重要的存在，因此我們想找出實用並且具備耐熱防火特性的材料來降低危險和意外的發生。結合之前的研究結果，並找尋相關資料及適合的藥品後，發現富氫表面修飾複合材料有優異的阻燃性能及化學穩定性，所以決定將富氫表面修飾複合材料分別進行兩種不同比例的藥品配置。再對塗層進行熱傳導及防火測試。而後我們得出三種不同比例的塗層的耐熱性及防火性最佳，而三種不同比例的富氫表面修飾複合材料中，富氫表面修飾複合材料塗層的耐熱性及防火性是最好的。在未來也可以持續本研究，將它們有效利用在鋰電池正極材料、防火塗料、建材及冷卻劑中，進而減少高溫火災的危害。

關鍵字：富氫表面修飾、複合材料、耐熱、防火、建築塗層

D10

Synthesis of Hydrogen-Rich Composites for Fireproofing and Thermal Insulation Coatings

Abstract

Advancements in industry and materials science have highlighted the crucial role of heat-resistant and fire-retardant coatings in protecting materials from high-temperature fire damage. Our research aims to identify practical materials with these properties to reduce risks and accidents. Based on previous research and relevant data, hydrogen-rich composite possesses superior flame-retardant performance and chemical stability. We prepared coatings with different proportions of these compounds and conducted thermal conduction and fire resistance tests. The results showed the hydrogen-rich composite coating demonstrated the best heat-resistance and fire-retardant properties. On the basis of the experimental results, the hydrogen-rich composite coating exhibited the best performance. This research can be applied to lithium battery cathode materials, fire-resistant coatings, building materials, and coolants.

Keywords: Hydrogen-rich layer, Composites, heat resistance, fire-retardant, building coatings