THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

國家鋼結構工程技術研究中心香港分中心
Chinese National Engineering Research Centre
For Steel Construction (Hong Kong Branch)

CNERC

NEWSLETTER

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FEATURE STORY

Inaugural meeting on a high-level research and development project commissioned by Research Institute of Standards and Norms of Ministry of Housing and Urban-Rural Development, China

Prof. K.F. Chung, Director of CNERC, and Dr. X.L. Yu, Senior Research Fellow of CNERC were invited to contribute to a high-level research and development project commissioned by **Research Institute of Standards and Norms of Ministry of Housing and Urban-Rural Development, China.** The project title is "*A comparative study on steel codes among Chinese and overseas construction industry for technical compatibility and alignment*". It is a project under the general research theme of "Fundamental research for construction standardization 2024" of the Institute. The project is administrated by China Construction Metal Structure Association. The project team consists of:

- **Prof. Y. J. Shi**, Tsinghua University – Principal Investigator
- **Prof. X. Y. Sun**, China Constructional Metal Structure Association
- **Prof. K. F. Chung**, The Hong Kong Polytechnic University
- **Prof. Z. M. Chen**, China Construction Science and Industry Corporation Ltd.

The inaugural meeting of the project was successfully held in Beijing on 26 February 2025.

The meeting was officiated by:

- **President Qi QU** China Construction Metal Structure Association
- **Director Bo CHEN** Research Institute of Standards and Norms, Ministry of Housing and Urban-Rural Development

Mr. Qi QU
President of CCMSA

Mr. Bo CHEN
Director of RISN, MHURD

The meeting was also attended by the following experts:

- **Chief Engineer Yinquan YU** China Design and Research Institute of Building Standards
- **Chief Engineer Lijun WANG** Huachengboyuan Engineering Technology Group
- **Deputy Chief Engineer Yaohua WU** Central Research Institute of Building and Construction Co., Ltd., MCC Group
- **Chief Engineer Qingde YANG** International Business Department of Beijing Urban Construction Group Co., Ltd.
- **Chief Engineer Qiang ZHANG** Jinhuan Construction Group Co., Ltd.

A detailed presentation of the project was made by Prof. Shi together with Prof. Sun and Prof. Chung.

Prof. X. Y. SUN

Prof. Y. J. SHI

Prof. K. F. CHUNG

- **Research motivation and methodology**

  This project aims to collect relevant standards on steel design and construction in China, the United States, Japan and Europe, and also to assess their technical differences. It is important to propose improvements to Chinese standards to facilitate export of Chinese steel materials and structures.

  Major tasks:
  1. Establish a system for structural steel standards appropriate for various "Belt and Road" countries, i.e. internationalized Chinese standards.
  2. Develop technical guidelines and application documents for these Chinese standards.
  3. Formulate technical promotion for a wide adoption of these Chinese standards.

- **Expected deliverables**
  1. To summarize key strengths and weaknesses of current Chinese and international standards for steel design and construction.
  2. To identify major discrepancies among key technical rules for steel design and construction in Chinese and foreign countries.
  3. To appraise current situations of internationalization of Chinese standards.
  4. To propose improvements to Chinese standards for technical compatibility and alignment with those of foreign countries.

- **CNERC contributions**

  Prof. K. F. Chung reported in the meeting that CNERC has been committed to promote innovation in steel construction, and to develop modern steel construction technology. CNERC has developed expertise on structural design and construction to both Chinese and European standards, in particular, on high strength S690 to S960 steel. Many technical and professional papers have been published on both European and Chinese practice based on a comprehensive research and development programme over the past few years.

Research Institute of Standards and Norms of Ministry of Housing and Urban-Rural Development, China

The Research Institute of Standards and Norms of Ministry of Housing and Urban-Rural Development was established in 1983 with the approval of the former Ministry of Science and Technology Commission. It is a national public welfare first-class scientific research institution, mainly responsible for the research and specific organization and preparation and management of national engineering construction standards and quotas. It is the only national scientific research institution in China that is engaged in both engineering technical standards and engineering economic indicators. Since its establishment, the Standard and Quota

Research Institute has focused on the technical management of standards, quotas and method parameters, policy research, key project preparation and technical consulting services.

Project of Fundamental Research on Standardization of Engineering Construction (2024)

The Project of Fundamental Research on Standardization of Engineering Construction was established for the first time in 2023 with the main content of conducting basic research on engineering construction standardization. It aims to implement the important instructions and instructions of General Secretary Xi Jinping on strengthening basic research and promote the interactive development of standardization and scientific and technological innovation. Engineering construction standardization is an important means to improve engineering quality, ensure safety and improve efficiency. With the advancement of technology and changes in market demand, standardization work needs to be continuously updated and improved to adapt to the new situation. The project goals are to improve the standard system, improve the quality of standards, promote technological innovation, and strengthen international docking. Basic research on engineering construction standardization is of great significance to improving the industry level, promoting technological progress, and enhancing international competitiveness. Through systematic research, it will provide scientific basis and practical guidance for engineering construction standardization.

China Construction Metal Structure Association

The China Construction Metal Structure Association was established in 1981. It is a national, industry-based, non-profit social organization voluntarily formed by enterprises, scientific research institutions, design units and related professionals engaged in the building metal structure industry. The association's purpose is to promote technological progress, quality improvement and sustainable development in the building metal structure industry, promote exchanges and cooperation within the industry, safeguard the legitimate rights and interests of members, and provide support for government decision-making. Its main functions include: industry services, standard setting, technical exchanges, policy recommendations and international cooperation. The association's industry management department is the Ministry of Housing and Urban-Rural Development. The association has 25 branches responsible for industry management, technology promotion, standard setting, training and exchanges in different fields. The China Building Metal Structure Association has played an important role in promoting technological progress and standardized development, standardization construction and international exchanges in China’s building metal structure industry.

FEATURE STORY

The first steel structure building industry chain innovation achievement promotion and exchange meeting

On the morning of 9 April 2025, Prof. K. F. Chung, Director of CNERC, Dr. B. Li, Postdoctoral Fellow, and Mr. W. Chen were invited by the China Iron and Steel Association to attend the first steel structure building industry chain innovation achievement promotion and exchange meeting. Leaders of relevant government departments and bureaus of the national ministries and commissions, Hebei Provincial Departments, China Iron and Steel Association, China Building Metal Structure Association, China Minmetals, MCC Group, representatives of major enterprises, experts, major parties concerned of the Tangshan Municipal Party Committee and Municipal Government, Secretary-General of the Tangshan Municipal Party Committee, Tangshan Municipal Government, Secretary-General and relevant deputy secretaries-general of the Tangshan Municipal Government, relevant municipal units, major responsible personnel of the Chinese governments (city, district), financial institutions, and heads of relevant key enterprises in Tangshan attended the conference.

With the theme of "Promoting industrial collaboration and leading development through innovation", the Conference attracted more than 500 experts, scholars and entrepreneurs from the steel structure industry across Mainland China to discuss new measures and new ideas for the collaborated development of steel structure buildings and the steel industry. Prof. Chung, being a special guest, gave a presentation of conference report, "Research on Trends and Application Technologies of High-Strength Steel (Application of 690 & 960 MPa High-Strength Steel in Construction in Hong Kong and Macao Special Administrative Regions)". Starting from the mechanical properties and microstructural analysis of Q690 steel, the research field was gradually expanded to the welding control, structural performance and standard formulation of high-strength Q690 steel, and finally promoted its application in actual engineering projects in Hong Kong, Macau and Mainland China, such as the completed Tseung Kwan O Cross-Bay Bridge and Macau Bridge. The report was detailed and rich, and the conference delegates responded positively and enthusiastically.

Prof. Chung presentation on "Research on Trends and Application Technologies of High-Strength Steel (Application of 690 & 960 MPa High-Strength Steel in Construction in Hong Kong and Macao Special Administrative Regions)"

The first steel structure building industry chain innovation achievement promotion and exchange meeting

Prof. Chung had an exchange meeting with Mr. N. Xia, Vice President of China Iron and Steel Association

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ICE HKA G&S Seminar on “Application of ultra-high strength S960 steel - from concept to reality”

Institution of Civil Engineers (ICE) Hong Kong and the Young Member Section fo the Hong Kong Institution of Engineers jointly organized a technical seminar entitled “Application of ultra-high strength S960 steel - from concept to reality” on 9 January 2025 at The Hong Kong Polytechnic University. The event was supported by Civil Engineering and Development Department of the Government of HKSAR, and the Hong Kong Institution of Highways and Transportation.

Highlights:
The technical seminar focuses on the groundbreaking application of ultra-high strength S960 steel in engineering and construction, specifically within the context of the Contract No. ND/2019/04 project in the Fanling North New Development Area. This initiative, which includes collaboration between the Civil Engineering and Development Department, The Hong Kong Polytechnic University, AECOM Asia Company Limited, and the Daewoo-Chun Wo-Kwan Lee Joint Venture, represents a significant advancement in civil bridge construction, marking the world's first implementation of S960 steel. The seminar aims to explore the practical applications of S960 steel throughout various stages of the project, including research development, design, fabrication, construction, and quality assurance. Attendees gained insights into the benefits of using S960 steel, such as reduced weight and fewer piles, which contribute to lower carbon emissions and improved sustainability. Additionally, the use of S960 steel allows for off-site prefabrication, enhancing project efficiency and overall productivity.

With 250 registrations, this event attracted a diverse audience of professionals eager to discuss the challenges faced during the project and the innovative solutions developed in response. Participants will engage in discussions to deepen their understanding of best practices for utilizing ultra-high strength S960 steel in future construction projects, ultimately contributing to advancements in engineering and sustainable construction methods. This seminar promises to be an invaluable opportunity for networking and knowledge exchange among industry experts and stakeholders.

Programme:

6:30pm	Opening session By the Institution of Civil Engineers (Hong Kong)
6:45pm Presentation 1	Effective use of High strength S690 and S960 steels in construction by Ir Prof. K. F. Chung, the Hong Kong Polytechnic University
7:15pm Presentation 2	University – Government – Industry (UGI) Collaboration for S960 Steel Application by Ir Tom W. L. Leung, NDO, CEDD, the Government of Hong Kong SAR
7:35pm Presentation 3	Technical Guidance for adoption of ultra-high strength S960 steel in pilot steel footbridge projects by Ir Dr. H. C. Ho, the Hong Kong Polytechnic University
8:00pm Presentation 4	Design of two footbridges in the form of plated box girders by Ir Y. W. Leung, YWL Engineering PTe Limited.
8:20pm Presentation 5	Construction of ultra-high strength S960 steel footbridges by Ir Bear Ding, DCK JV
8:40pm Presentation 6	Construction of ultra-high strength S960 steel footbridges by Ir Raymond Hon, AECOM
9:00pm	Q&A Section
9:30pm	End of the event



Speakers (from left): Prof. K. F. Chung, Ir Tom Leung and Dr. H. C. Ho

Speakers (from left): Ir Y. W. Leung, Ir Bear Ding, and Ir Raymond Hon

Attendants of the Seminar

Q & A Session

Presentation of souvenirs

Moreover, this event was featured in the "Hong Kong Engineer" (April 2025) of The Hong Kong Institution of Engineers as extracted below.

Young Members Committee

Technical seminar on application of ultra-high strength S960 steel - from concept to reality

By Mr Tom LUI

The captioned technical seminar was held on 9 January 2025. Experts from academia, government, and industry explored the advances in S960 steel applications.

Distinguished speakers of the seminar included Ir Prof K F Chung and Dr H C Ho from Chinese National Engineering Research Centres - Hong Kong Branch (CNERC - HK); Mr Tom Leung from the Civil Engineering and Development Department; Mr Y W Leung from YWL Engineering Pte Ltd.; Mr Bear Ding

from Chun Wo Construction & Engineering Co Ltd. and Mr Raymond Hon from AECOM Asia Co Ltd. The event attracted nearly 200 attendees, demonstrating strong industry interest in the material.

A key focus was the successful application of S960 steel in the Fanling North New Development Area, Phase 1 - Fanling Bypass Eastern Section. This case study highlighted the superior mechanical properties of the steel and its efficiency, and sustainability. The steel will serve as a benchmark for future infrastructure projects by reducing material consumption while ensuring durability.

Ir Prof Chung and Dr Ho discussed the high-performance characteristics of S960 steel and emphasised its load-bearing capacity and environmental resistance. Mr Tom Leung addressed the steel's role in public works, stressing innovation and sustainability in Hong Kong's infrastructure.

Mr Y W Leung covered the design considerations of the steel, including dynamic and static loads and safety implications. Mr Bear Ding highlighted the logistical challenges such as transportation, storage, and welder expertise in ensuring quality. Mr Raymond Hon examined pre-heating and welding techniques critical for the steel's structural performance.

The audience's active engagement reflected a strong interest in S960 steel's broader implementation. The seminar concluded with a call for continued collaboration among engineers, researchers, and policymakers to promote widespread adoption and enhance sustainability and innovation in construction.


The speakers, the YMC Committee, and other organising parties

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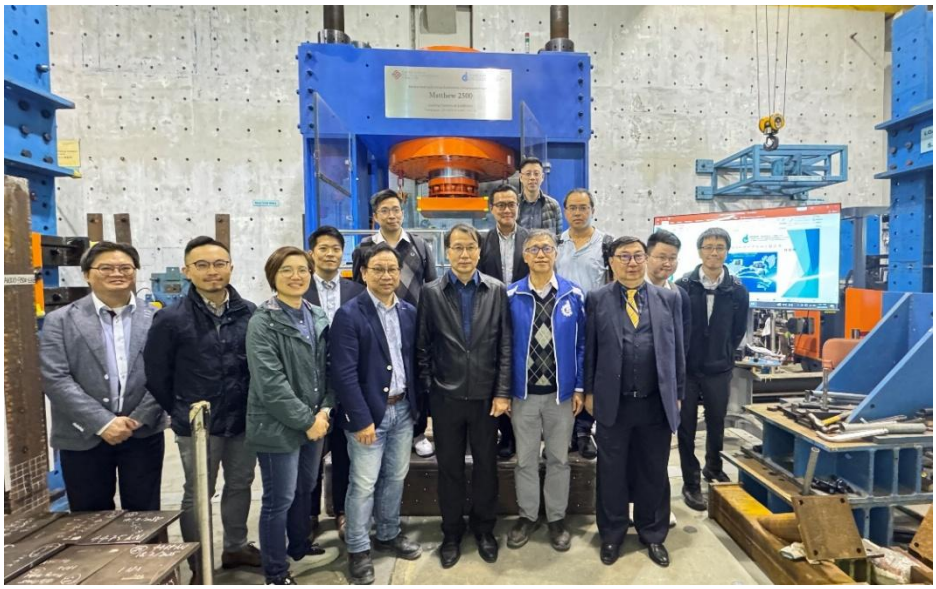
Visit of Technical Committee of *the Code of Practice for the Structural Use of Steel* of the Buildings Department, the Government of Hong Kong SAR

Ir Alvin Ho-cheong Lai, Assistant Director of Buildings Department (BD), led a delegation team of members of Technical Committee of *the Code of Practice for the Structural Use of Steel* to visit CNERC on 21 February 2025. The delegation team consists of:

- Ir Alvin LAI, Assistant Director of Buildings Department
- Ir Adrian HO, Chief Structural Engineer of Buildings Department
- Ir Patrick LEE, Senior Structural Engineer of Architectural Services Department
- Ir Sherman CHANG, Senior Structural Engineer of Housing Department
- Ir Prof Adam CHOY, Representative from the Hong Kong Institution of Engineers
- Ir Kylie LAM, Representative from the Hong Kong Institution of Engineers
- Ir Wing-sum NG, Representative from the Hong Kong Construction Association Limited
- Mr Danny CHAN, Representative from the Hong Kong Registered Contractors Association
- Dr Jia-ji WANG, Representative from the University of Hong Kong
- Dr Yu-xin PAN, Representative from Hong Kong University of Science and Technology

The delegation team visited both the Structural Engineering Research Laboratory (Laboratory Y001) and the Welding Laboratory (Laboratory W002) of PolyU.



Prof. K.F. Chung and Ir Alvin Lai took a group photo together with members of the Technical Committee, BD engineers and CNERC research personnel

A presentation on the research work and major achievements of CNERC was made by Dr. Y. F. Hu to the delegation team, in particular, both welding technology and assessment on structural behaviour of welded sections and members of high strength 690 N/mm^2 steel. In-depth exchange was made on various aspects of current practice on fabrication and quality control of structural steelwork, in particular, materials specifications of high strength S690 steel, mechanical properties of both parent plates and welded sections, and welding procedures specifications.

The following presentations on effective use of high strength S690 steel in construction were made:

- Experimental investigations and structural appraisal into stocky composite columns with high strength S690 steel tubes and Grade C60/75 concrete
  by Ir Prof. K. F. Chung
- Deformation characteristics of high strength S690 socketed H-piles in site conditions
  by Ir Dr. Andy Leung
- Recent construction projects using high strength S690 and S960 steel in both civil engineering and building structures
  by Ir Dr. H. C. Ho

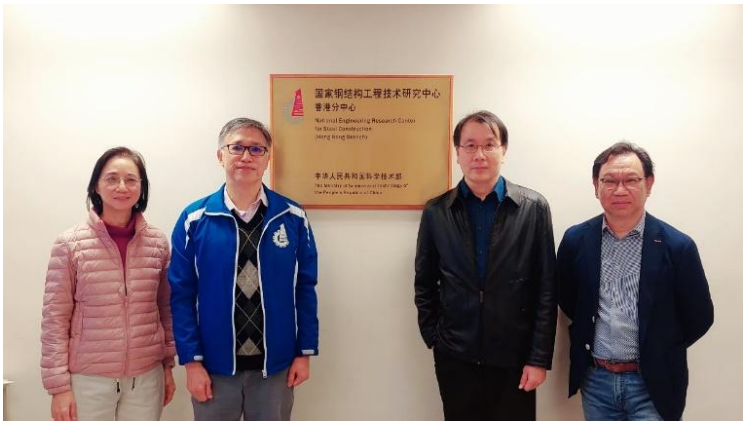
Innovations of these projects were thoroughly illustrated and discussed among members of the Technical Committee and CNERC research personnel.

Presentation by Prof. Chung to members of the Technical Committee

Presentation by Dr. Leung to members of the Technical Committee

Presentation by Dr. Ho to members of the Technical Committee

Many members of the Technical Committee considered both the laboratory visits and the presentations and discussions were highly informative. They expressed that they were interested in incorporating innovations into the Code, and facilitating applications of modern steel construction technology in the private sector, whenever appropriate.



Prof. K.F. Chung and Dr. M.F. Hui took a photo with Ir Alvin Lai and Ir Adrian Ho

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Mr. Eric K. F. Yuen, PhD student of CNERC received a Student Presentation Award at the Third ASCE Greater China Conference in Guangxi, China on 20 January 2025.

NEWS

CNERC's research on "Innovative construction technology and application of high strength S690 steel in construction" received The HKIE Grand Award 2023 Grand Prize on Innovative Application (Innovation Category: Sub-category – An Innovative Application) of The Hong Kong Institution of Engineers, in addition to this, it is also archived in the "Hong Kong Engineering Archive", and the project details can be viewed at: https://www.hkie.org.hk/ea/en/project/246

THE HONG KONG INSTITUTION OF ENGINEERS
香港工程師學會

Project Owner/Promoter/Government Department:
Chinese National Engineering Research Centre for Steel Construction (Hong Kong Branch), The Hong Kong Polytechnic University

Key achievements of CNERC on effective use of high strength S690 steel in construction include:

a) development of an innovative construction technology using S690 steel with proven structural efficiency;

b) development of effective welding on 10 to 70 mm thick S690 steel plates through the use of a robotic welding system which ensures little reduction in mechanical properties of these plates after welding;

c) rationalised methods for structural design of welded sections, connections and joints of S690 steel members; these methods are in line with current engineering practice in Hong Kong;

d) innovative applications of S690 steel in building and civil engineering projects;

e) compiling Technical Guide *"Effective Design and Construction to Structural Eurocodes: EN 1993-1-1 Design of Steel Structures"* (Second Edition); this Guide was published by **the Construction Industry Council** in 2021, and it covered structural design to S690 steel in civil engineering structures; and

f) updating *the Code of Practice for the Structural Use of Steel* of **the Buildings Department** to facilitate effective use of S690 steel in private building structures; this upgraded edition was published in 2023, and it included a comprehensive set of technical guidance and design rules together with design parameters and tables of 60 pages.

Our innovation enables a modern construction technology using the high strength S690 steel to achieve significant savings in construction materials, manpower demand, and carbon footprints. Typical applications include long span roof structures and footbridges, large scale noise closure, piles supporting heavily loaded structures and buildings, and supporting members in road bridges.

NEWS

Prof. K. F. Chung, Director of CNERC was invited to attend The Hong Kong Registered Contractors Association's 5th Committee Inauguration Ceremony and its 10th Anniversary Celebration Dinner on 27 February 2025.

NEWS

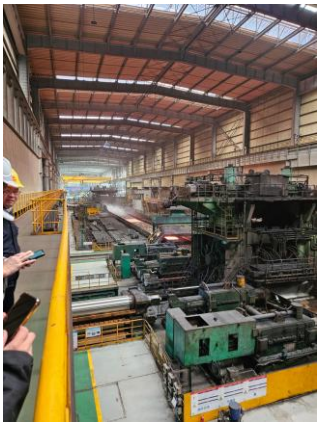
Prof. K. F. Chung, Director of CNERC visited the China Civil Engineering Construction Corporation in Macau to meet with Mr. M. Cui, Deputy General Manager and Executive Project Manager of the Fourth Macao-Taipa Bridge on 19 March 2025.

NEWS

Hong Kong Metal Engineering Contractors Association exchange tour on high strength steel industry chain

Prof. K. F. Chung, Director, and Dr. H. C. Ho, Deputy Executive Secretary of CNERC were invited by the Hong Kong Metal Engineering Contractors Association as experts to lead the industry representatives to the Beijing-Tianjin-Hebei region for a tour on high strength steel industry chain and conduct technical exchanges with steel companies during 23 – 25 March 2025.

During the tour, the delegates visited leading high strength steel companies in the Beijing-Tianjin-Hebei region, including Shandong Iron and Steel Group Rizhao Co., Ltd. and Huafeng Shouqin Metallurgical Technology (Tianjin) Co., Ltd., a subsidiary of Baosteel Group, focusing on understanding the quenching and tempering of high-strength steel and thermomechanical controlled rolling and controlled cooling production technology, as well as the world's leading high-strength steel seamless pipe production technology.



Visited Shandong Iron and Steel Group Rizhao Co., Ltd. for inspection on production technology of high strength steel

Group photo with Shandong steel

Witnessed the signing of a technical collaboration between
Jumbo Consturction Technology and Huafeng Shouqin Metallurgical Technology

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Dr. H. C. Ho, Deputy Executive Secretary, and Dr. B. Li, Postdoctoral Fellow of CNERC were invited by the Guangdong-Hong Kong-Macao Greater Bay Area Architectural Technology Alliance to participate in the Second Guangdong-Hong Kong-Macao Greater Bay Area Architectural Science and Technology Exchange Conference on 27 March 2025.

NEWS

Prof. K. F. Chung, Director, Dr. B. Li, Postdoctoral Fellow, and Mr. W. Chen, PhD student of CNERC visited the Central Iron and Steel Research Institute and Xiangtan Iron and Steel Group for technical exchanges on high-strength steel materials, welding and applications on 10 April 2025.

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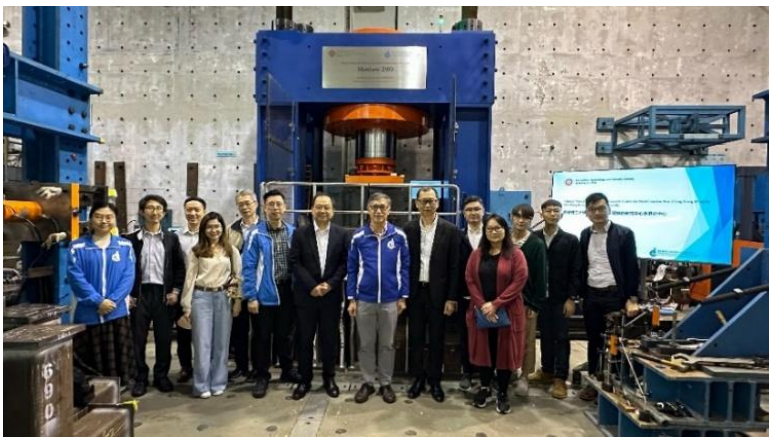
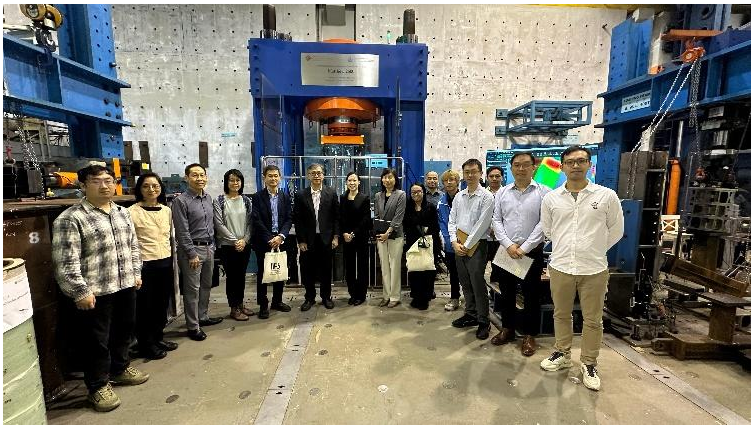
Prof. K. F. Chung, Director of CNERC was invited by the Building and Construction Authority of Singapore for a visit together with Prof. S. P. Chiew of Singapore Institute of Technology, and Mr. Julian Lee, and had a meeting with Mr. Kaliannan and several chief engineers and steel structure experts, and he shared a pilot project of the Civil Engineering and Development Department of the Government of HKSAR, which successfully used 630 tons of high-strength S960 steel to build a total of two large pedestrian bridges on 30 April 2025.

VISIT



Ir Ricky Leung, Executive Director of Engineering & Technology at Airport Authority Hong Kong led a delegation team to visit the CNERC on 14 March 2025.



Ir. S. Y. Tse, Deputy Head of Geotechnical Engineering Office (Landslip Preventive Measures) led a team of delegates to visit the CNERC for discussion of a research project on fatigue behaviour of corroded steel members on 11 April 2025.

CONTACT US

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