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Chinese National Engineering Research Centre for Steel Construction (Hong Kong Branch) Newsletter – Special Issue (May 2025)

The second expert meeting on CSCS Group Standard “Design of steel structures using 690-960MPa high strength steel” in Beijing

During 21 - 22 May 2025, the second expert meeting along with a special report meeting on CSCS Group Standard “Design of steel structures using 690 – 960MPa high strength steel” has been successfully held at Tsinghua University, Beijing. The special report meeting aims to introduce the research background and draft basis of group standard clauses, so as to lay a foundation for the smooth convening of the second expert meeting on 22 May 2025. The drafting work of the group standard is jointly undertaken by CNERC and Tsinghua University. As core members of CSCS group standard drafting team, Prof. K. F. Chung, Director of CNERC, Dr. H. C. Ho, Deputy Executive Secretary of CNERC, and Dr. Y. F. Hu, Research Assistant Professor, leading a delegation of seven research personnel attended the meeting. The meeting was co-chaired by Prof. Chung and Prof. Y. J. Shi from Tsinghua University.



The special report meeting was co-chaired by Prof. Chung and Prof. Shi

Lists of drafters:

No	Name	Title	Organization	Note
1	K. F. CHUNG	Professor	The Hong Kong Polytechnic University	Principal drafter
2	Yongjiu SHI	Professor	Tsinghua University	Principal drafter
3	H. C. HO	Principal Research Fellow	The Hong Kong Polytechnic University	Principal drafter
4	Huiyong BAN	Associate Professor	Tsinghua University	Principal drafter
5	Y. F. HU	Research Assistant Professor	The Hong Kong Polytechnic University	Principal drafter
6	X. L. YU	Senior Research Fellow	The Hong Kong Polytechnic University	Drafter
7	M. F. ZHU	Postdoctoral Fellow	The Hong Kong Polytechnic University	Drafter
8	H. JIN	Postdoctoral Fellow	The Hong Kong Polytechnic University	Drafter
9	X. F. YANG	Postdoctoral Fellow	The Hong Kong Polytechnic University	Drafter

Lists of experts:

No	Name	Title	Organization	Note
1	Ailin ZHANG	Professor	Beijing University of Technology	Expert
2	Mingxuan HE	Professor level senior engineer	China Baowu Steel Group Corp.	Expert
3	Lijun WANG	Design Master, Professor	Huachengboyuan Engineering Technology Group	Expert
4	Zhan WANG	Professor	South China University of Technology	Expert
5	Tie XI	Professor level senior engineer	Hebei Jinxi Iron and Steel Group Co., Ltd.	Expert
6	Baowei DANG	Executive vice president	China Construction Industry Association (Steel and Wooden Structures Branch)	Expert
7	Yuyin WANG	Professor	Harbin Institute of Technology	Expert
8	Junjie LUO	Professor	Guangzhou University	Expert
9	Lu YANG	Professor	Beijing University of Technology	Expert
10	Fei XU	Professor	Chongqing University	Expert
11	Yanbo WANG	Professor	Tongji University	Expert
12	Ke KE	Professor	Chongqing University	Expert

13	Xuanding WANG	Associate Professor	Chongqing University	Expert
14	Cheng CHEN	Associate Professor	Southwest Petroleum University	Expert
15	Fangxin HU	Associate Professor	South China University of Technology	Expert
16	Mingxiang XIONG	Associate Professor	Guangzhou University	Expert
17	Andi SU	Professor	Harbin Institute of Technology	Expert
18	Zhipan ZENG	Chief Engineer	Fujian Provincial Institute of Architectural Design and Research Co., Ltd.	Expert
19	Juan WANG	Professor	CapitaLand Co., Ltd.	Expert
20	Lifen MA	Chief Engineer	Zhenhua Port Machinery Company	Steel manufacturer
21	Gaoyang YANG	Chief Engineer	China State Construction Engineering Corp.	Steel manufacturer
22	H. Y. LEE	Chief Engineer	Hong Kong Constructional Metal Structures Association	Building contractor
23	William LUK	Director	Chun Wo	Building contractor
24	C. F. CHAN	General Manager	Gammon	Building contractor
25	Dezhong ZHENG	Mr.	China Construction Industry Association (Steel and Wooden Structures Branch)	
26	Yanping SUN	Ms.	Zhenhua Port Machinery Company	
27	Qiang GUO	Mr.	Zhenhua Port Machinery Company	



Experts meeting in progress

The special report meeting of CNERC (Hong Kong Branch) was held on 21 May 2025, and presentations were given on the following topics:

- Experimental and numerical investigations into welded H-sections and tubular sections
Dr. Y. F. HU
- Column design of steel and composite columns under axial compression
Dr. X. L. YU
- Effects of welding on structural performance of high strength steel thick welded sections
Dr. H. JIN
- Numerical simulation on the structural behaviour of high strength S690 and S960 welded stocky columns
Dr. M. F. ZHU
- Construction of footbridges of stiffened box girders with a total of 630 tons of S960 steel
Dr. H. C. HO
- Structural behaviour of S960 welded sections: Experimental and numerical investigations
Prof. K. F. CHUNG



Dr. Y. F. HU



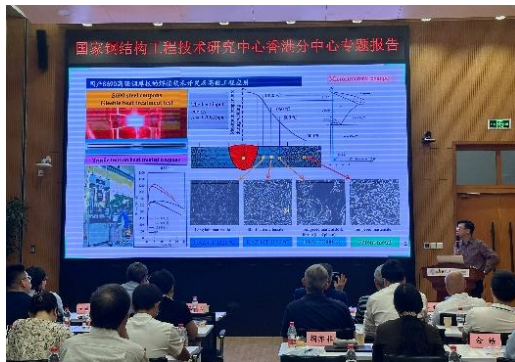
Dr. X. L. YU



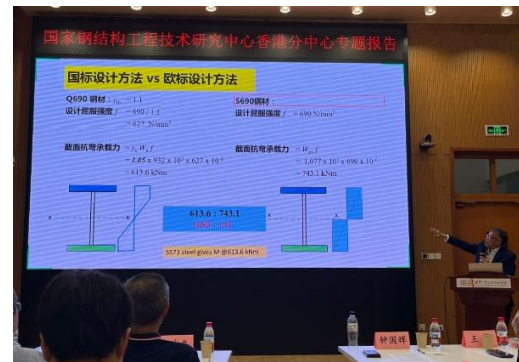
Dr. H. JIN



Dr. M. F. ZHU



Dr. H. C. HO



Prof. K. F. CHUNG

The special report is based on a number of experimental and numerical investigations on mechanical properties and structural behaviour of S690 and S960 welded sections completed by CNERC in recent years. Moreover, CNERC was appointed by the Civil Engineering and Development Department of the Government of Hong Kong SAR to provide technical advice on both welding technology and structural design of a public work project in Fanling North. A total of 630 tons S960 steel was adopted to build two large scale pedestrian foot bridge system.

Application in construction

香港九龙东将军澳跨湾连接路双拱钢桥

澳门大桥（澳氹四桥）

这些示范工程明确地展示了港澳特区和国内建筑业携手合作，成功使用国产优质高强 S690 钢材，建设了世界一流的结构，这开启许多可能性...

<p>设计 国际知名桥梁咨询公司</p> <p>加工 中国龙头钢构制造商</p> <p>验收 特区政府欧盟标准和规范</p>	<p>建造 中国龙头承建商</p> <p>钢材 国产优质高强 690 兆帕钢材</p> <p>达到 国际建筑工程项目水平</p>
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2024.08.06



Qualified welding procedures specifications for site welding of the S960 steel using *robotic welding* had been also certified.

These two foot bridges are scheduled to open to the public in December 2025.

Both the research work and the application of these S960 steel in construction projects were considered to be essential for technical promotion of the high strength steel construction technology. Many experts congratulated Prof. CHUNG and his team, and all of them commended highly the work of CNERC.

On 22 May 2025, the second expert meeting on the group standard “Design of steel structures using 690 ~ 960MPa high strength steel” was held in the New Civil Engineering Building at Tsinghua University. Prof. Yongjiu SHI from Tsinghua University, representing the standard drafting team and the conference organizer, delivered a welcoming address and hoped that the attending experts can provide valuable comments or suggestions on the first draft of group standard.



Photo of all attending experts



A welcoming address was delivered by Prof. Yongjiu SHI from Tsinghua University



Prof. K. F. CHUNG introduced the drafting progress of group standard to experts



Dr. Y. F. HU introduced the first draft of group standard to experts

Firstly, Prof. K. F. CHUNG and Dr. Y. F. HU provided a detailed introduction to the drafting progress, main contents and innovations of the group standard. Subsequently, the attending experts made intensive discussions encompassing the following issues of 690 ~ 960MPa high strength steel:

- Design parameters of the mechanical properties of high strength steel and relevant quality control requirements.
- Seismic performance-based design of high strength steel and technical requirements for seismic energy dissipation zones.
- The bending resistance design of cross section with plasticity development and section classification for: (1) compression member; (2) flexural member; (3) beam-column.
- Design buckling curve for high strength steel slender column, according to experimental data.
- Design method for welding joints of circular and square steel tubes, according to Eurocode 3.
- Design methods for the section resistances of CFSST and CFCST stocky columns and for the buckling resistance of CFSST and CFCST slender columns according to Eurocode 4; design method for composite beam according to the current GB standard.
- Special welding process and quality control requirements for high strength steel according to Eurocode and GB standard.
- Standardized expression of related provisions of welding process for high strength steel.



Prof. Yongjiu SHI



Prof. Ailin ZHANG



Prof. Lijun WANG



Prof. Zhan WANG



Prof. Tie XI



Prof. Yuyin WANG



Dr. Junjie LUO



Prof. Lu YANG



Prof. Yanbo WANG



Associate Prof. Xuanding WANG



Associate Prof. Cheng CHEN

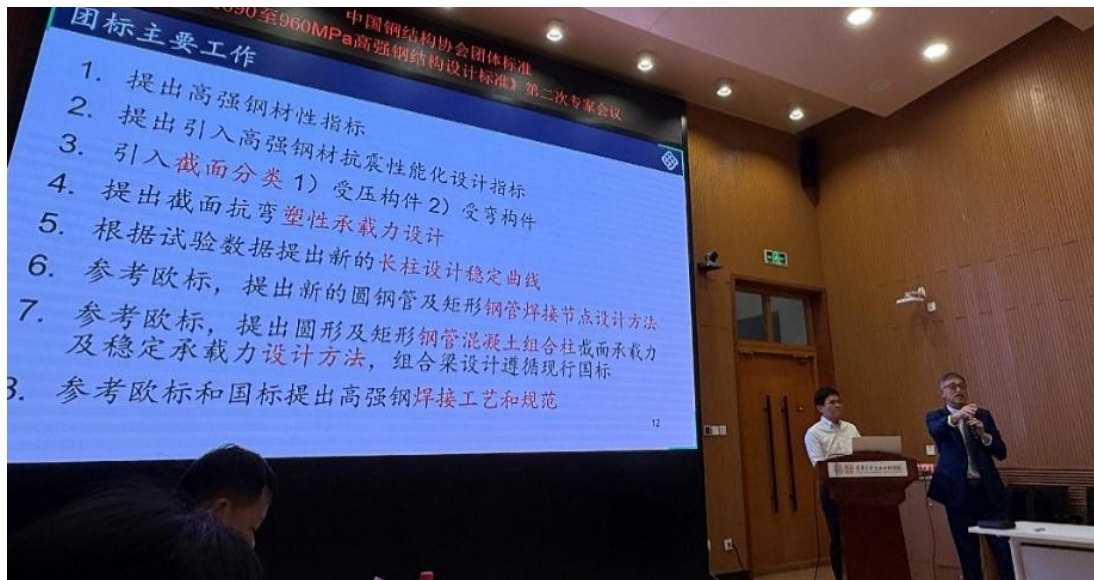


Chief Engineer Lifen MA

After heated discussions, experts have reached a consensus on the following key issues:

- Agree that the partial material factor of 690 ~ 960 MPa high strength steel can be taken as 1.0 or 1.1 based on different quality controls to determine the design value of yield strength;
- Agree to adopt the plate width to thickness ratio and section classification method to select the relevant design values of section modulus, according to Eurocode 3;
- Agree to adopt the full plastic section modulus for design and the calculation method for bending resistance with plasticity development, according to Eurocode 3;
- Agree that 690 ~ 960 MPa high strength steel can be used for structural components such as buildings and bridges in China. Effective isolation and damping measures can be taken under major or rare earthquakes, and effective seismic performance-based design can also be adopted;
- Agree that when the seismic performance-based design method is adopted, the material properties of 690 ~ 960 MPa high strength steel without yielding under major or rare earthquakes shall meet: the yield ratio shall not exceed 0.95, and the elongation after fracture shall not be less than 12%. In general, plastic development is allowed to occur at the base of steel columns;

- Agree to adopt class a* buckling curve for welded H- and welded box- sections, according to experimental data;
- Agree to adopt Eurocode 4 design formulas to calculate the compressive resistances of axially and eccentrically loaded CFSST and CFCST stocky/slender columns with S690 steel and C60/75 concrete;
- Agree to adopt the welding process evaluation method and welding quality inspection method for 690 ~ 960 MPa high strength steel, according to Eurocode and GB standard.



Before the end of discussion, Design Master Lijun WANG emphasized: there is a relevant blank worldwide in design standards for the application of 690 ~ 960 MPa high strength steel. Therefore, the current group standard under drafting is critically important for global construction projects, and serves as a crucial basis for promoting the application of high strength steel structures both domestically and internationally. When our group standard adopts the Eurocode's design philosophy and expression method, it facilitates foreign engineers to learn from and reference China's design technology of high strength steel structures, and they also obtain a scientific and complete efficient design system. I think this is a good precedent.

Finally, Prof. K. F. CHUNG highly valued and appreciated the opinions and comments proposed by experts, and agreed to adopt them. A statement was made on the preliminary work and engineering applications of 690 ~ 960 MPa high strength steel closely related to the group standard drafting content. He sincerely hopes to work together with all experts to complete the group standard, and promote its extensive applications in practical engineering.

After the meeting, the experts visited the Major Engineering Structure Laboratory of Tsinghua University under the guidance of former Director Zonggang WANG. He gave a detailed explanation of the construction background and tortuous history of campus old and new laboratories, as well as the overview and function of experimental equipment and loading devices, and current experimental projects.



A group photo in Engineering Structure Laboratory of Tsinghua University



Expert Committee of CSCS Technical Group Standard “Design of steel structures using 690~960MPa high strength steel”



A group photo in front of the Cross Bay Link, Tseung Kwan O group photo of the First Meeting of the Expert Committee

Special Symposium of Hong Kong Branch, CNERC

Location: Room B200, New Civil Engineering Building, Tsinghua University

2025.05.21 Wednesday	Research progress on 690-960 MPa ultra-high strength structural steel
14:30 pm	Welcoming address by Professor K.F. CHUNG, Director of CNERC (Hong Kong Branch)
14:40 pm Report 1	Experimental and numerical investigations into welded H-sections and tubular sections Presenter: Dr. Yifei Hu
15:00 pm Report 2	Column design of steel and composite columns under axial compression Presenter: Dr. Xianglin Yu
15:20 pm Report 3	Effects of Welding on Structural Performance of High Strength Steel Thick Welded Sections Presenter: Dr. Hao Jin
15:40 pm Report 4	Numerical simulation on the structural behaviour of high strength S690 and S960 welded stocky columns Presenter: Dr. Mengfei Zhu
16:00 pm	Coffee break
16:20 pm Report 5	Construction of footbridges of stiffened box girders with a total of 630 tons of S960 steel Presenter: Prof. K.F. CHUNG, Dr. H.C. Ho
16:40 pm Report 6	Structural behaviour of S960 welded sections: Experimental and numerical investigations Presenter: Dr. H.C. Ho, Prof. K.F. CHUNG
17:00 pm	End
18:00 pm	Dinner Location: Jiasuo Restaurant, Tsinghua University

Expert meeting on 《Design of steel structures using 690 ~ 960 MPa high strength steels》

Location: Room B200, New Civil Engineering Building, Tsinghua University

2025.05.22 Thursday	Expert Meeting on Group Standard of China Steel Construction Society
9:00 am	Second Expert Committee Meeting Chairman: Prof. K.F. CHUNG & Prof. Y.J. Shi Welcoming address: Prof. Y.J. Shi Major developments since First Meeting Presenter: Prof. K.F. CHUNG & Dr. Y.F. Hu Key contributions of the Standard Presenter: Prof. K.F. CHUNG & Dr. Y.F. Hu
9:50 am	Discussions by experts – I
10:20 am	Coffee break
10:35 am	Discussions by experts – II
9:00 ~ 11:35 am	Summary of meeting minutes By Dr. X. L. YU and Dr. M. F. ZHU End of meeting
12:00 am	Lunch Location: Guanchou Yuan Dinning Hall, Tsinghua University
14:00 pm	Technical visit Location: Laboratory of Engineering Structure, Tsinghua University