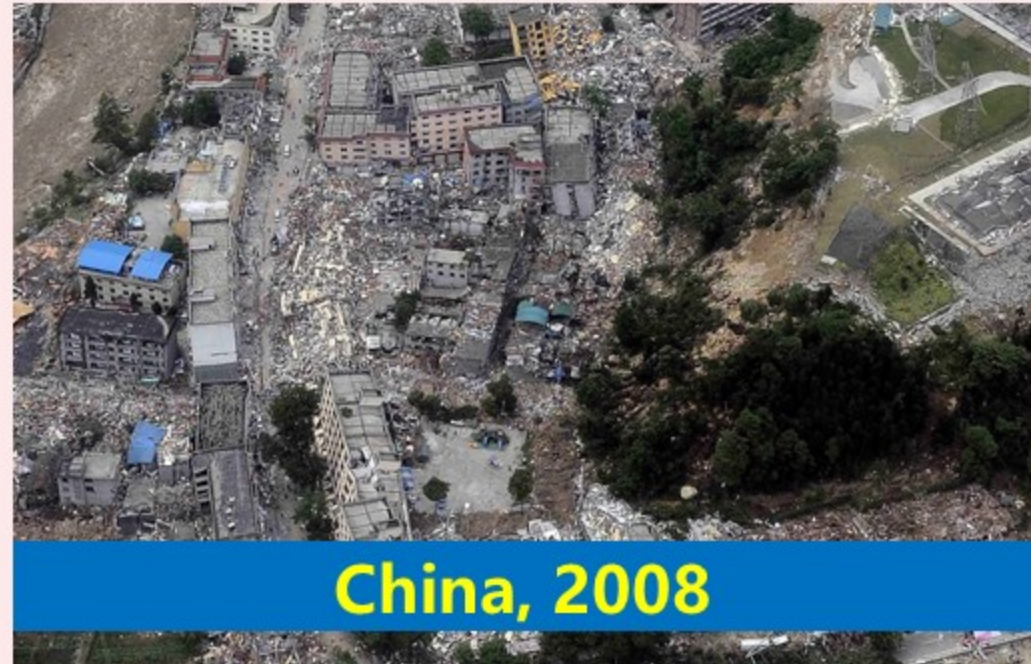




Cascade High-energy Earthquake-fire Coupling Test System

More Than 18% Deaths Due to Fire Following Earthquakes!

Wenchuan Earthquake



China, 2008

Mont Blanc Tunnel Fire



France, 1999

Crimean Bridge Fire



Russia, 2022

Earthquakes and fires are both frequent and highly destructive disasters. Over 20,000 earthquakes with a magnitude of 4.5 or higher occur worldwide each year, and approximately over 70,000 people die from fires. The coupling of earthquakes and fires always leads to even more serious consequences. In fact, **18% of deaths is caused by secondary fires following earthquakes**. Therefore, efficient prediction and simulation of coupling effect of earthquakes and fires are essential for ensuring safety of lives and engineering structures.

World's First Earthquake-fire Test System

Traditional systems



Separated testing



Uniform ideal fire



Single monitoring

VS

More Scientific

More Realistic

More Advanced

Advantages of Our Invention

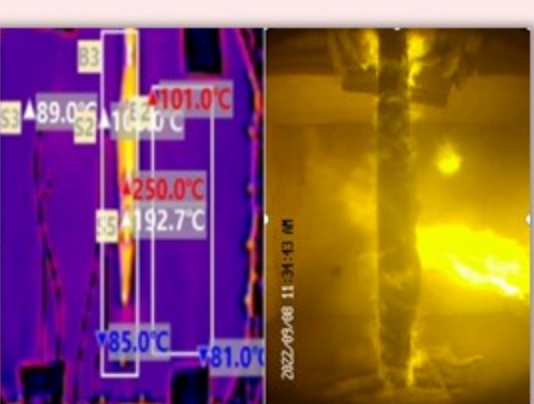
In-situ testing



Non-uniform real fire



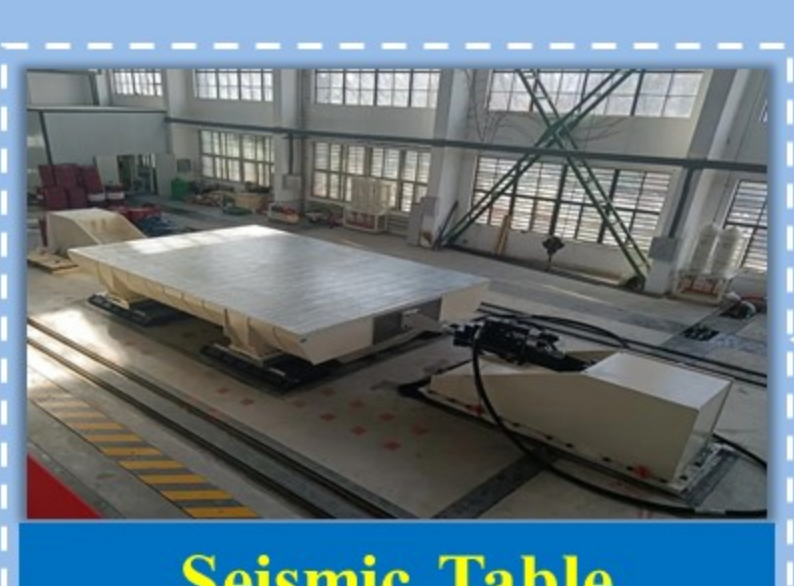
Multiple monitoring



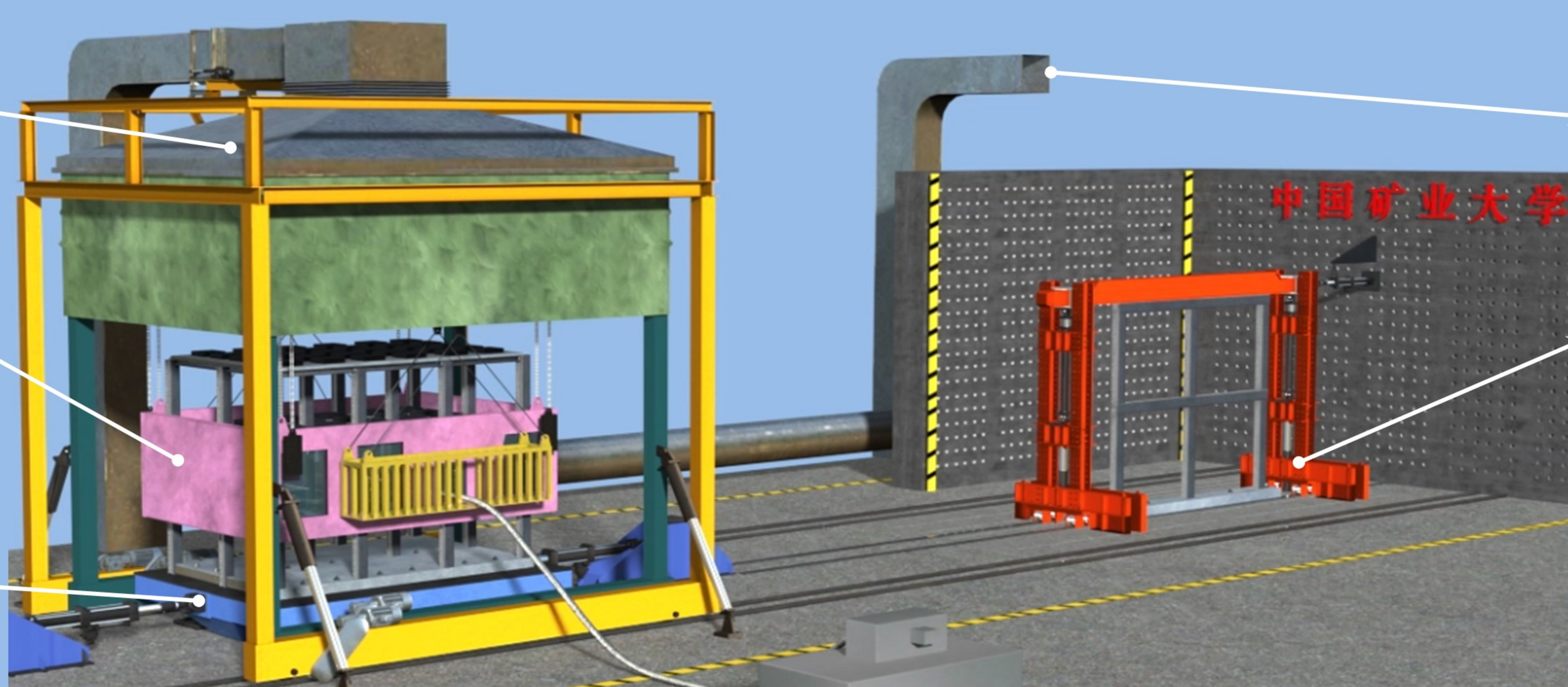
Gas Calorimeter



Fire Furnace Assembly



Seismic Table



Purification System



Quasi-seismic Loading



In-furnace Imaging

Achievements



12 Patents



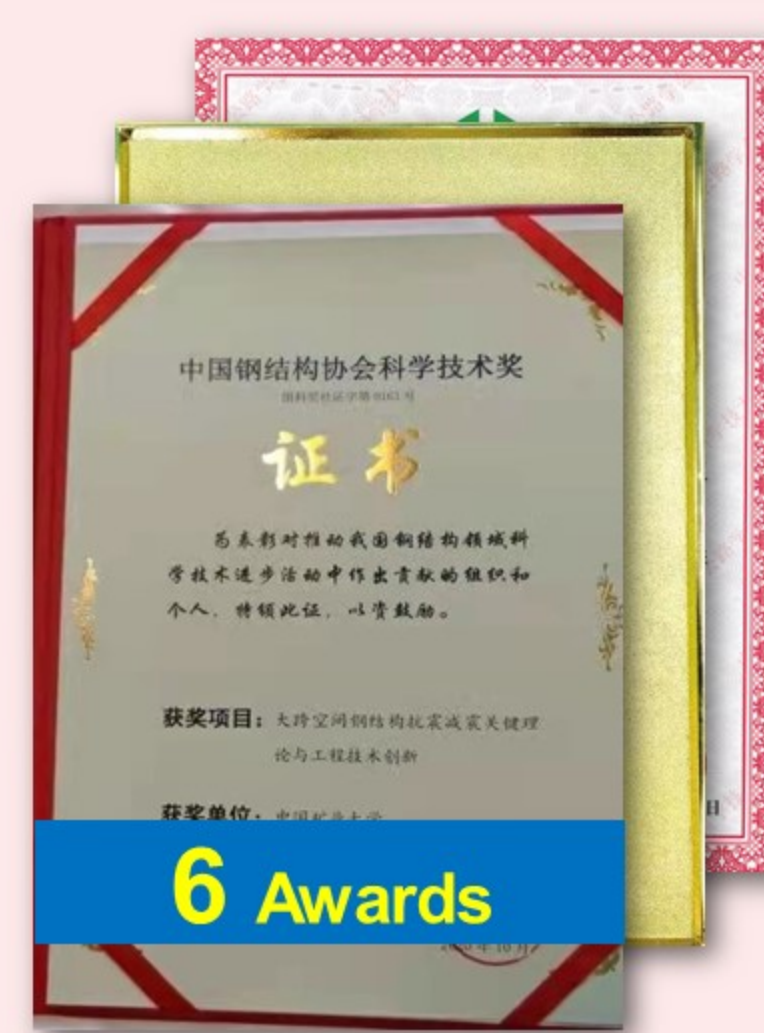
25 SCI Papers



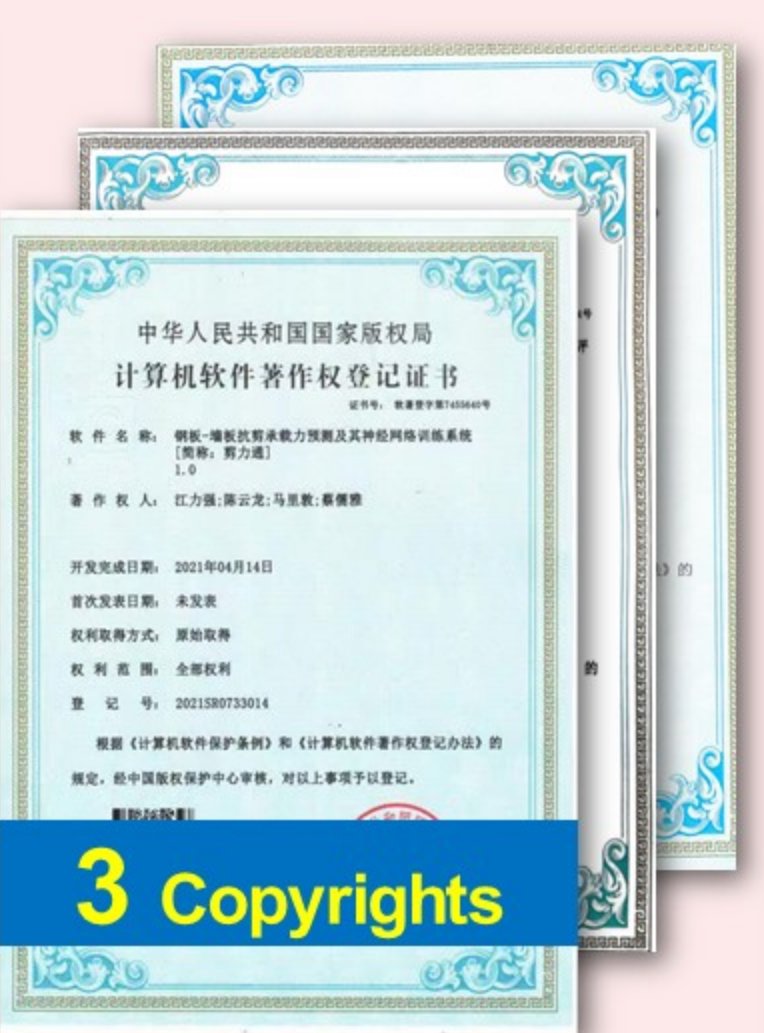
4 Codes



Canada



6 Awards



3 Copyrights



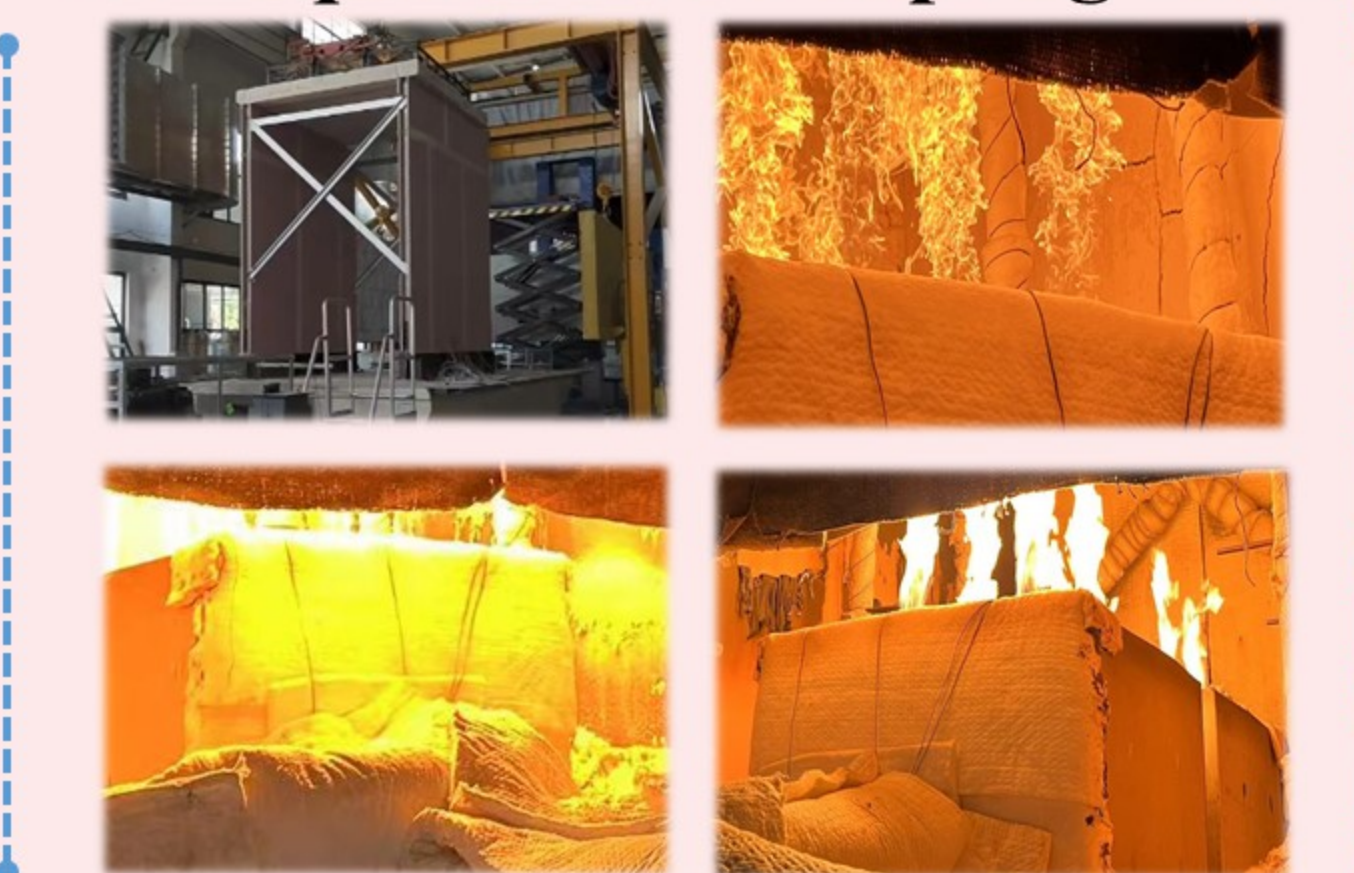
6 Licenses

Scientific Testing

Traveling Fire-collapse Tests

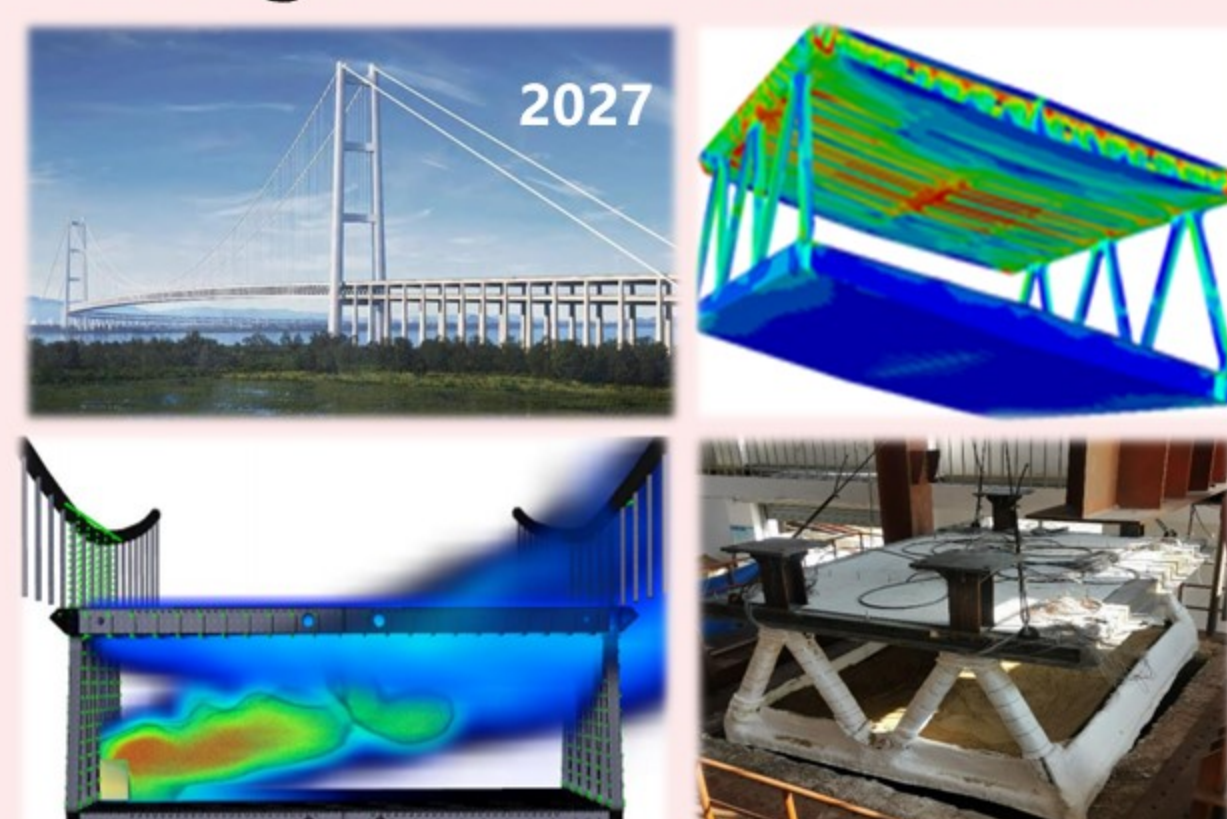


Earthquake-fire Coupling Tests



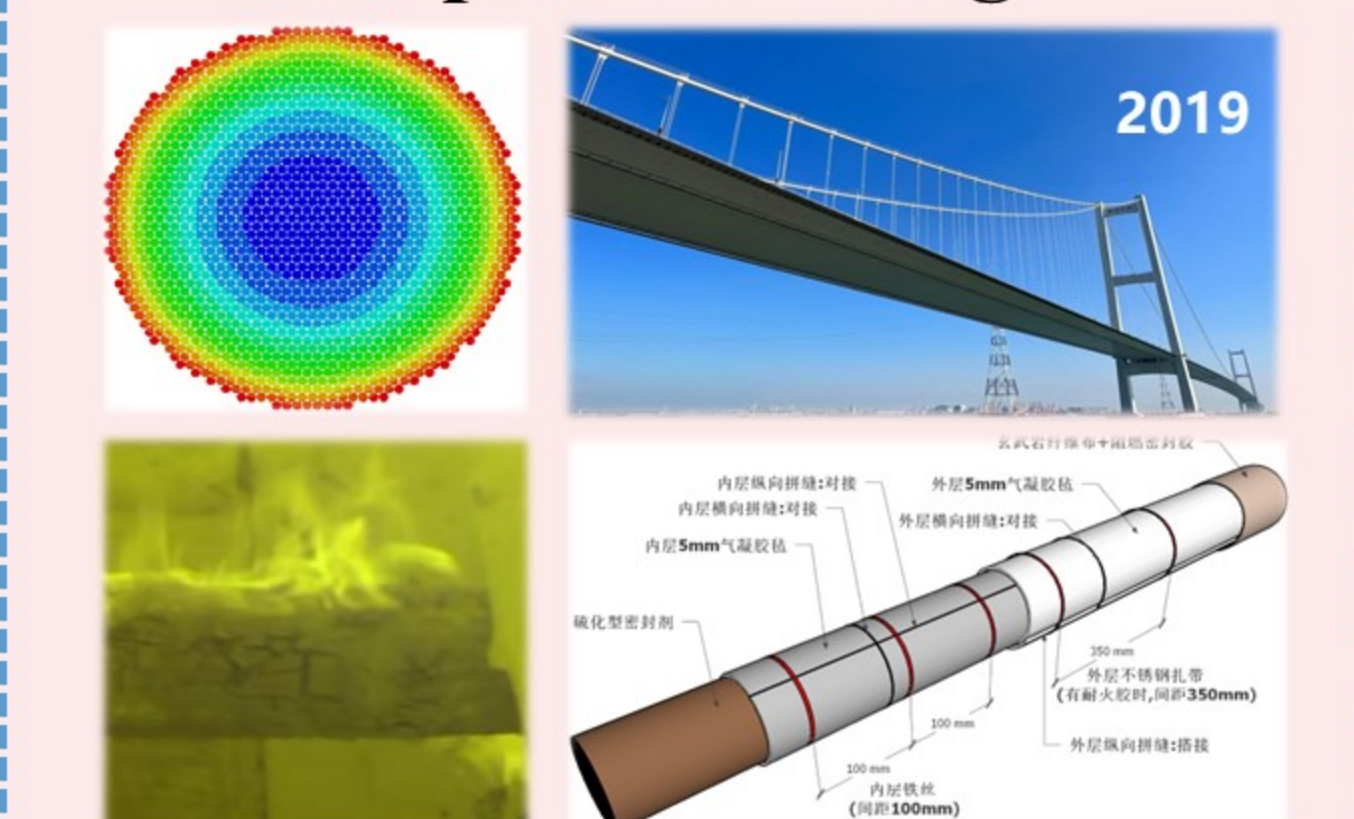
Engineering Application

World's 1st Longest Suspension Bridge under Construction



Shiziyang Channel
Main Span-2180m

World's 3rd Longest Suspension Bridge



Nansha Bridge
Main Span-1688m

- Patents: CA 3 181 365; ZL 2021 1 0517180.0 et al.
- Exceeding \$276,900,000 economic benefits in the past 3 years!
- Applied to 50+ global civil engineering projects.

EARTHQUAKE



FIRE



2011.3.11 Great East Earthquake, Japan

EARTHQUAKE

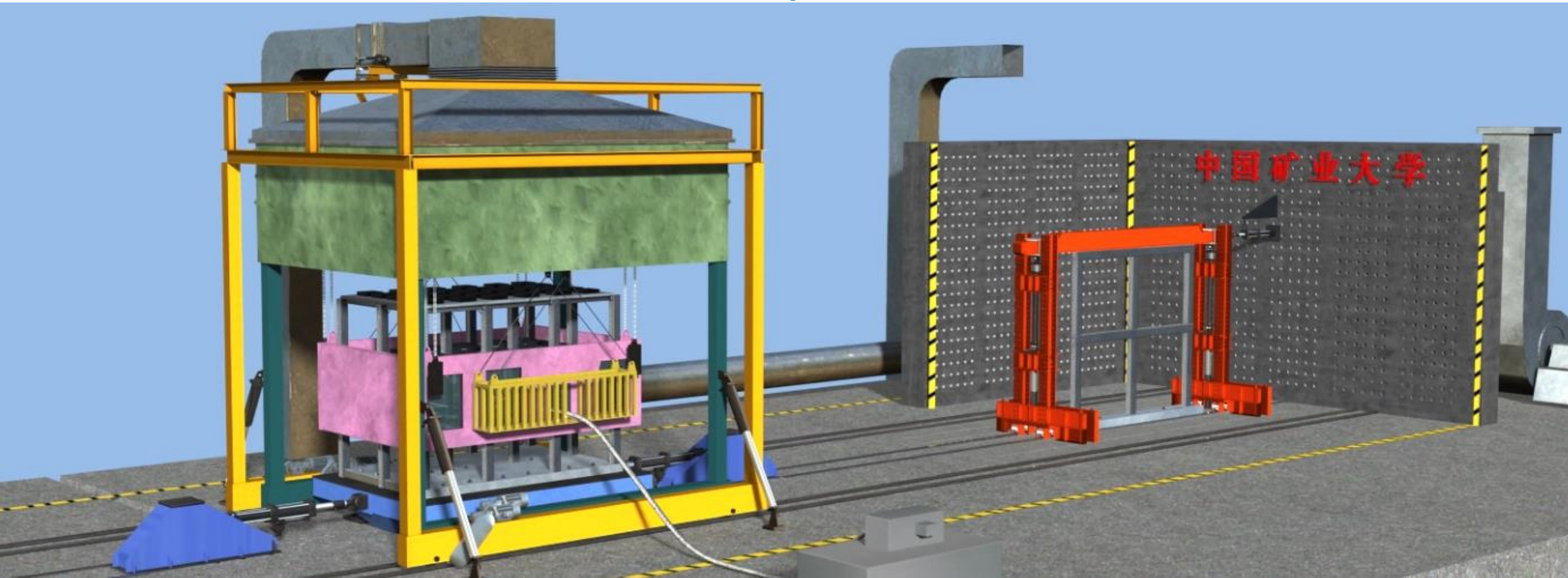
FIRE



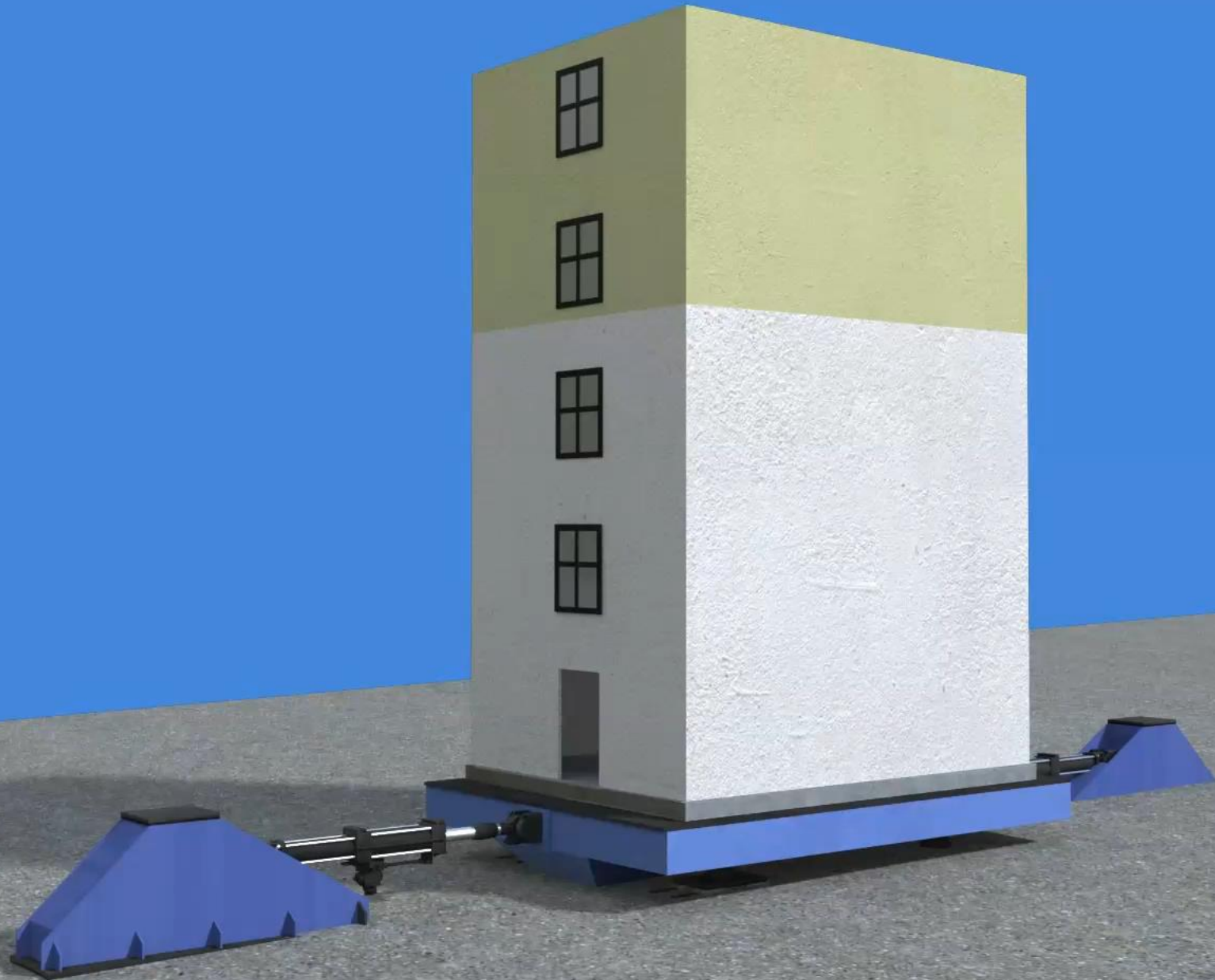
2023 ISE "INFOINVENT"

Patents: CA 3,181,365 ; ZL 2021 1 0517180.0 et al.

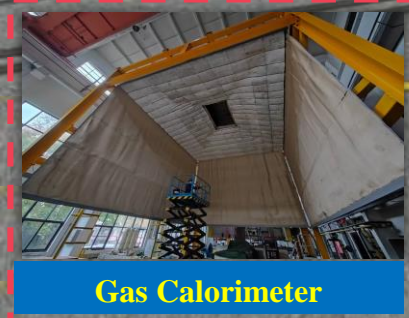
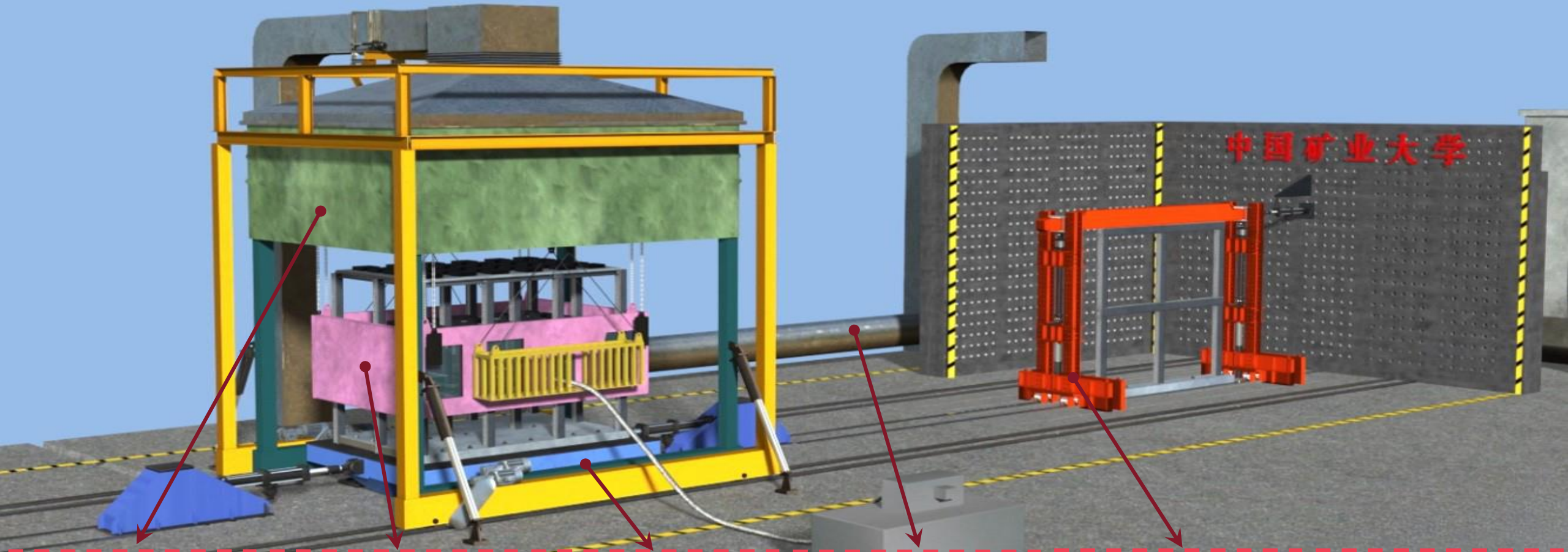
Invention: Cascade High-Energy Earthquake-Fire Coupling Test System



Existing Issues



Equipment Introduction



Gas Calorimeter



Fire Furnace Assembly



Seismic Table



Purification System

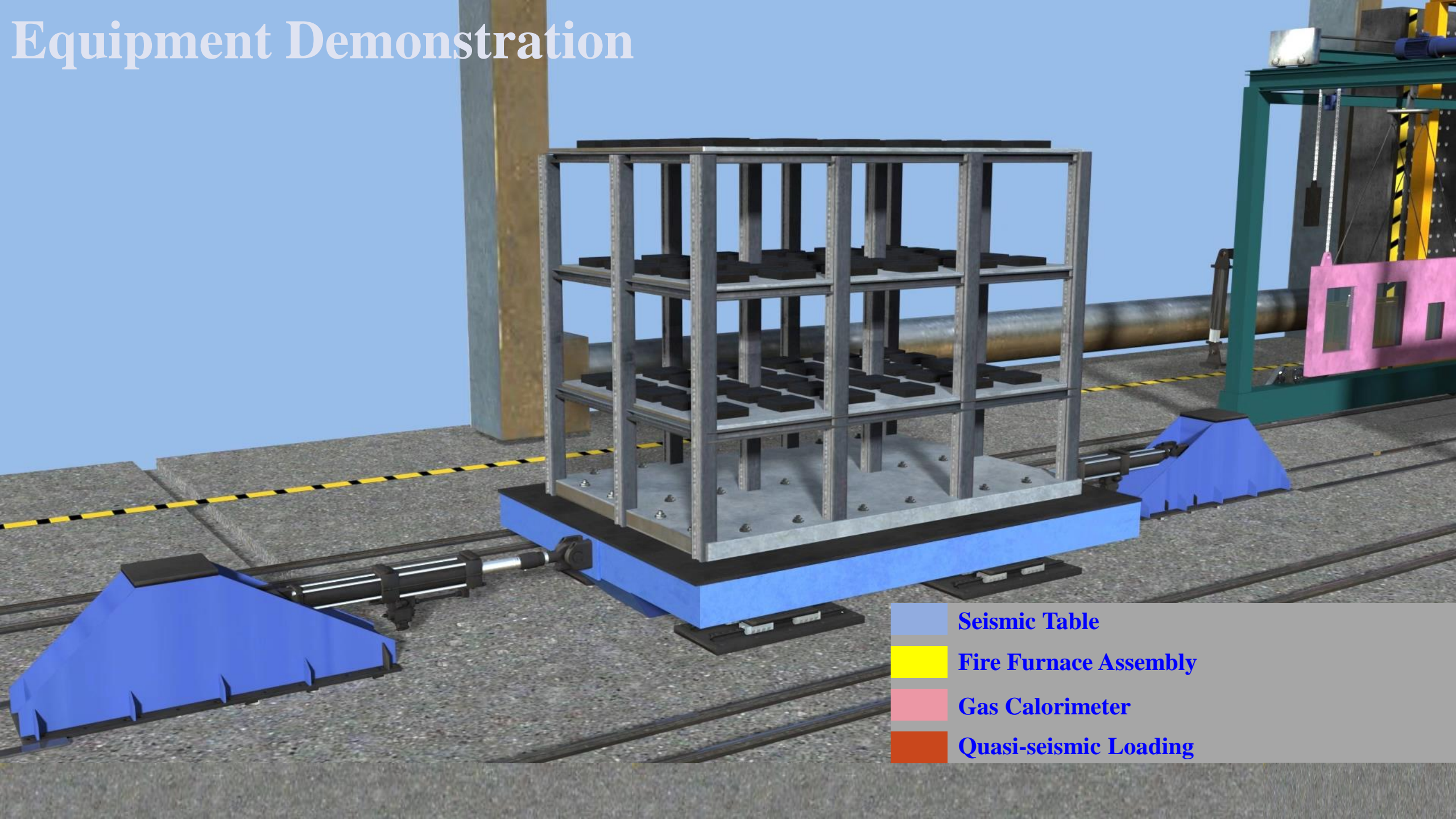


Quasi-seismic Loading



In-furnace Imaging

Equipment Demonstration



Seismic Table

Fire Furnace Assembly

Gas Calorimeter

Quasi-seismic Loading

Shaking Table-Real Fire Tests



Shaking table



Real fire



Other Representative Tests



Seismic Building Test



Steel Frame Structure Test



Carpark Test



Wall Test



Main Cable Test

WORLD'S FIRST EARTHQUAKE-FIRE TEST SYSTEM

Traditional Systems

VS

Advantages of Our Invention



Separated
testing

<
More
Scientific

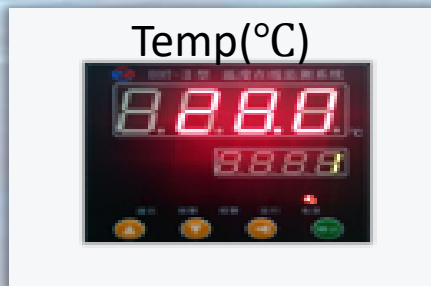
In-situ
testing



Uniform
ideal fire

<
More
Realistic

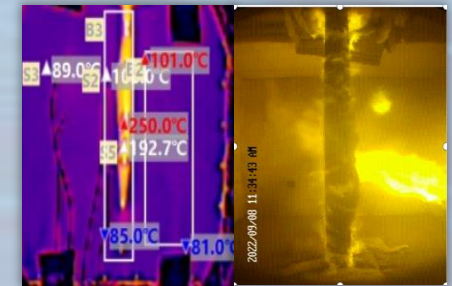
Non-uniform
real fire



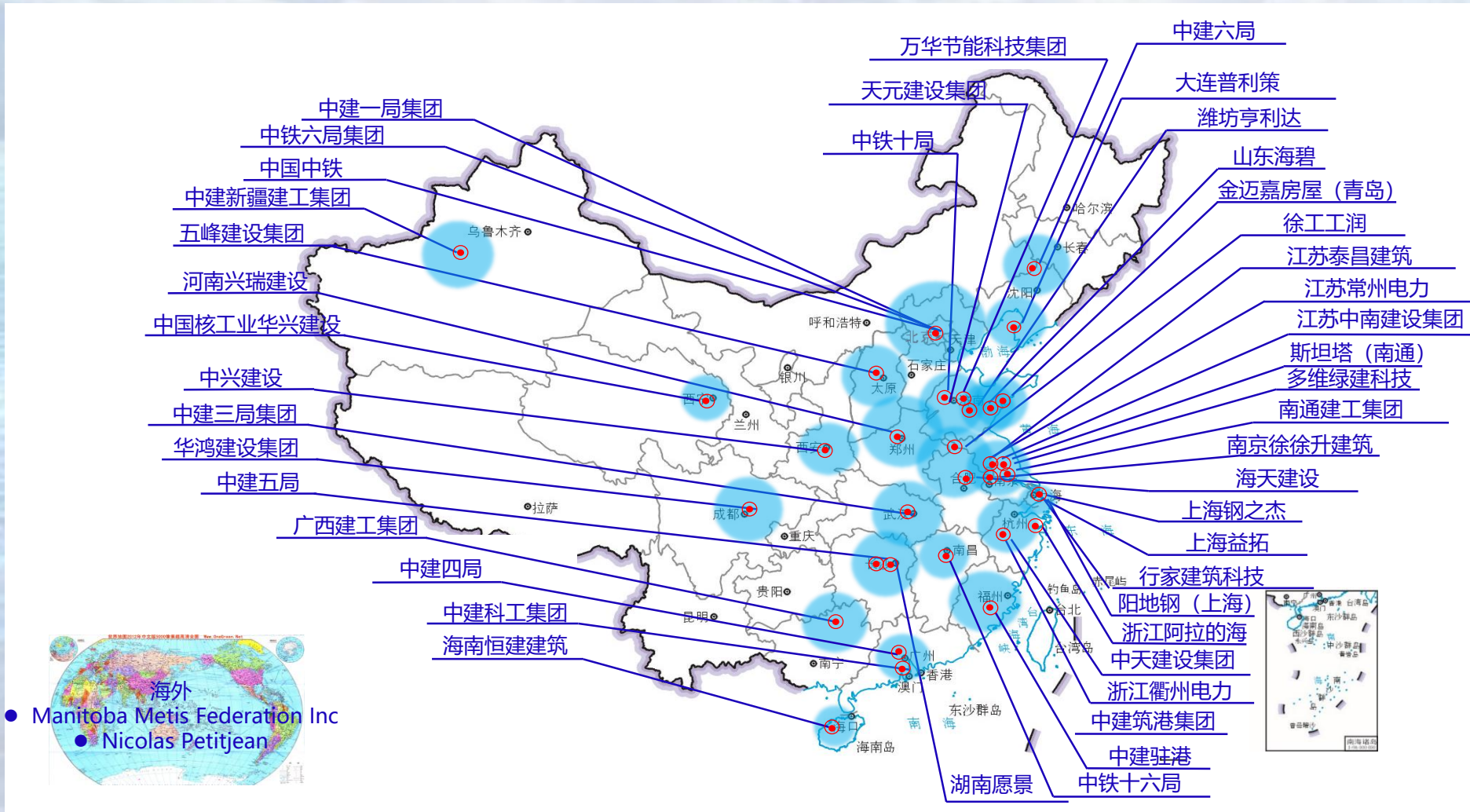
Single
monitoring

<
More
Advanced

Multiple
monitoring



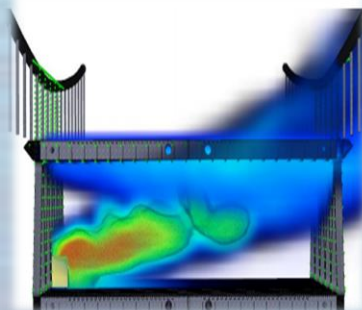
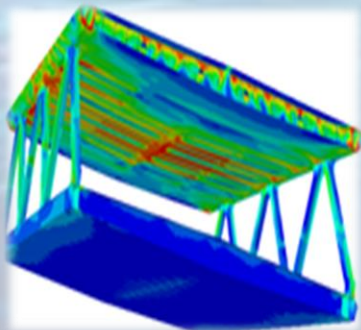
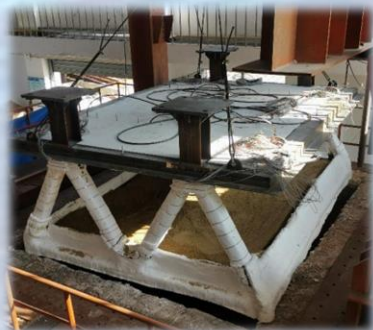
- Exceeding **\$ 276, 900, 000** economic benefits!
- Applied to **50+** global civil engineering projects!



Shiziyang Channel (Main Span-2180m)



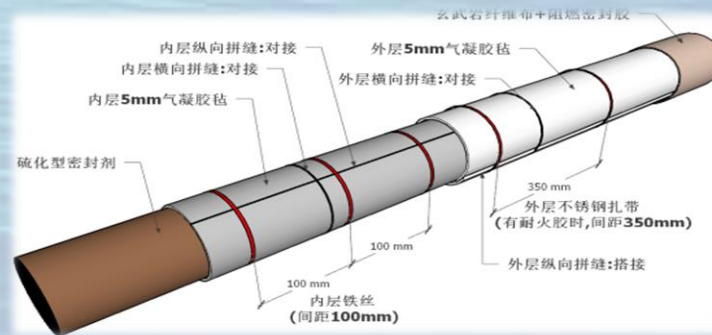
World's **1st Longest** Suspension Bridge under Construction



Nansha Bridge (Main Span-1688m)



World's **3rd Longest** Suspension Bridge



Innovation, Sciences et Développement économique Canada / Innovation, Science and Economic Development Canada


Brevet canadien / Canadian Patent

3,181,365
Numéro de brevet / Patent number


Le commissaire aux brevets a accordé un brevet pour l'invention décrite dans le mémoire descriptif portant le numéro de brevet susmentionné. Le mémoire descriptif est accessible dans la Base de données sur les brevets canadiens sur le site Web de l'Office de la propriété intellectuelle du Canada.

The Commissioner of Patents has granted a patent for the invention described in the specification under the above-noted patent number. The specification is accessible in the Canadian Patents Database on the website of the Canadian Intellectual Property Office.

Commissaire aux brevets / Commissioner of Patents



(CIPO - 91) 2020-08-15



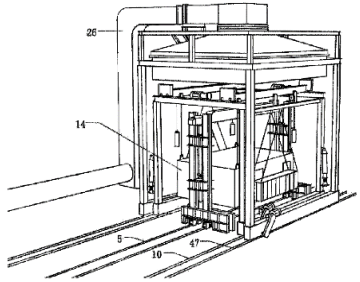
Innovation, Sciences et Développement économique Canada / Innovation, Science and Economic Development Canada

CA 3181365 C 2023/08/15
(11)(21) **3 181 365**

(12) **BREVET CANADIEN / CANADIAN PATENT**
(13) C

(86) Date de dépôt PCT/PCT Filing Date: 2022/01/28	(51) Cl.Int./Int.Cl. G01M 99/00 (2011.01), G01K 7/36 (2006.01), G01M 7/02 (2006.01)
(87) Date publication PCT/PCT Publication Date: 2022/11/12	(72) Inventeurs/Inventors: CHEN, WEI, CN; YE, JIHONG, CN; JIANG, JIAN, CN; GUO, ZHEN, CN; ZHAO, WUCHAO, CN; LI, RUI, CN
(45) Date de délivrance/Issue Date: 2023/08/15	(73) Propriétaire/Owner: CHINA UNIVERSITY OF MINING AND TECHNOLOGY, CN
(85) Entrée phase nationale/National Entry: 2022/11/08	(74) Agent: CHEN, JUNYI
(86) N° demande PCT/PCT Application No.: CN 2022/074545	
(30) Priorité/Priority: 2021/05/12 (CN202110517180.0)	

(54) Titre : **SYSTEME DE TEST DE COUPLAGES SEISME-INCENDIE A HAUTE ENERGIE EN CASCADE**
(54) Title: **CASCADED HIGH-ENERGY EARTHQUAKE-FIRE COUPLED TEST SYSTEM**



(57) Abrégé/Abstract:
The present disclosure discloses a cascaded high-energy earthquake-fire coupled test system. The system includes a self-balanced loading system, a lifting furnace system, and a fume collecting hood system transversely arranged on an upper end of the lifting furnace system to collect fume; the self-balanced loading system includes two mobile reaction force frames capable of traveling on a first track and a high-temperature self-sensing loading beam transversely arranged on top portions of the two mobile reaction force frames; the lifting furnace system includes a furnace body mounting rack, inside which a combined furnace body is hung, being capable of traveling on a second track, two moving beams are slidably connected to an upper end of the furnace body mounting rack, movable mobile hoist engines are arranged at lower end surfaces of the moving beams, and an operating device is hung on bottom portions of the mobile hoist engines.

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证书号第 4968881 号
发明专利证书
发明名称: 一种置于火灾高温环境内的便携式 300 度全量程测震装置

证书号第 5424797 号
发明专利证书
发明名称: 一种多工位测试加载系统

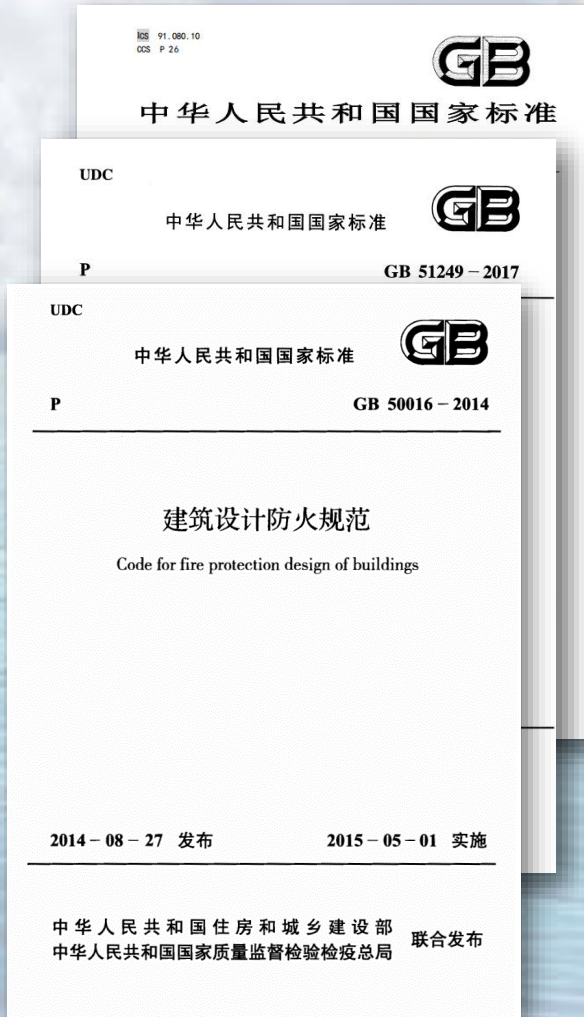
证书号第 5161665 号
发明专利证书
发明名称: 一种级联高能地震-火灾耦合试验系统
发明人: 陈伟; 叶继红; 姜健; 郭震; 赵武超; 李瑞
专利号: ZL 2021 1 0517180.0
专利申请日: 2021 年 05 月 12 日
专利权人: 中国矿业大学
地址: 221116 江苏省徐州市铜山区大学路 1 号
授权公告日: 2022 年 08 月 17 日 授权公告号: CN 11320270 B
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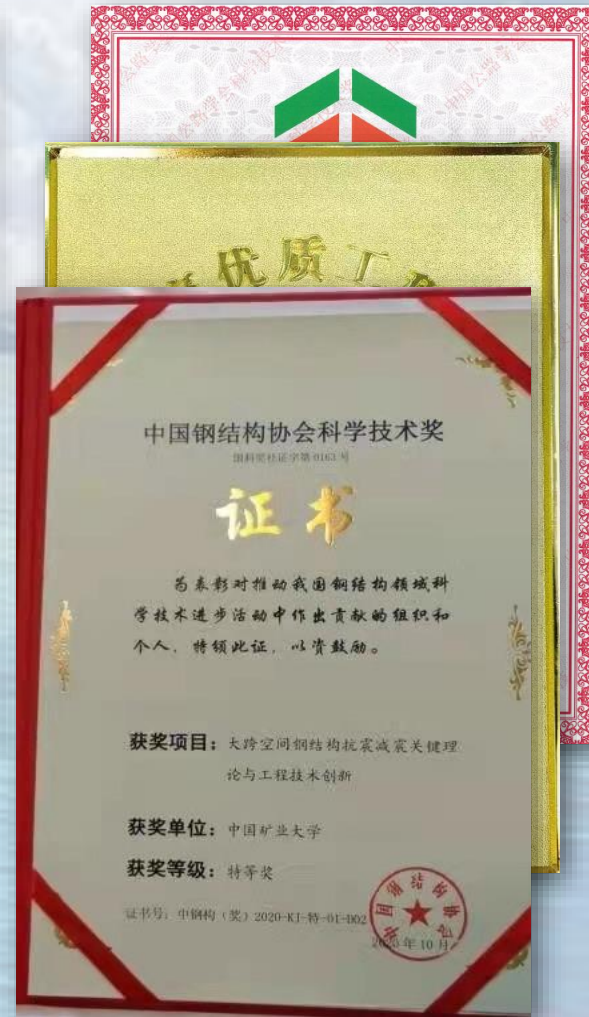
12 Invention Patents



25 SCI Papers



4 Industry Standards



6 Awards



9 Copyrights and Licensing Contracts



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CHINA UNIVERSITY OF MINING AND TECHNOLOGY



力学与土木工程学院
SCHOOL OF MECHANICS AND CIVIL ENGINEERING



深部岩土力学与地下工程国家重点实验室
STATE KEY LABORATORY FOR GEOMECHANICS
& DEEP UNDERGROUND ENGINEERING

Inventors:

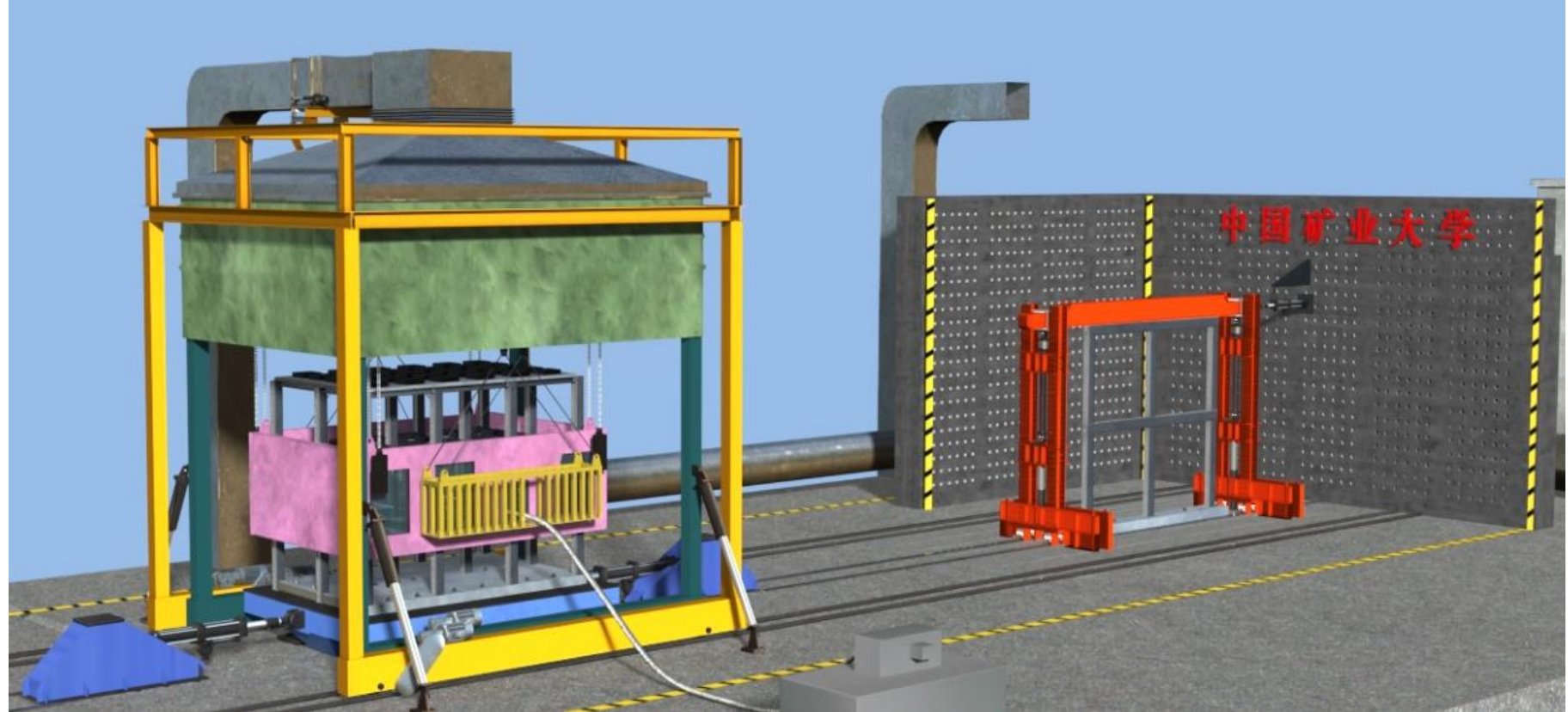
Professor Wei Chen

Professor Jihong Ye

Professor Jian Jiang

Professor Zhen Guo

Professor Liqiang Jiang



Thank you for your attention!