Preface

We are pleased to present the proceedings of the 7th International Conference of Protective Structures "ICPS7", which was successfully held from 12 to 15 May 2025 in Abu Dhabi. Abu Dhabi is an emerging global hub for innovation and education with cutting-edge research facilities, prestigious academic institutions, and a vibrant cityscape, offering a perfect setting for the ICPS7 conference. The first ICPS international conference on protective structures in this dynamically developing region provided a unique opportunity for many researchers from around the world to communicate and exchange insights.

ICPS originated in 2010 in Manchester, UK (1st ICPS). This global event has since traversed the globe, making impactful stops in Potsdam, Germany, in 2013 (2nd ICPS/ISIEMS), Newcastle, Australia, in 2015 (3rd ICPS), Beijing, China, in 2016 (4th ICPS), Poznan, Poland, in 2018 (5th ICPS) and Auburn, USA, in 2023 (6th ICPS). The organizing committee was pleased to present the conference program with four reputable keynote speakers in the field of material engineering. In addition, more than 150 presentations covered most domains in the field of material and impact loadings. Also, four sponsors and exhibitors from leading instrument-providing and cutting-edge technology companies in the field participated in the event.

This conference was organised by the Technology Innovation Institute (TII), a global research centre dedicated to pushing the frontiers of knowledge. Our teams of scientists, researchers, and engineers worked in an open, flexible, and agile environment to deliver discovery science and transformative technologies. Our work means we will not only be prepared for the future; we will create it. Working together, we were committed to inspiring innovation for a better tomorrow. TII is part of the Abu Dhabi Government's Advanced Technology Research Council (ATRC), which oversees technology research in the emirate.

We hope this proceeding will be a valuable resource and inspiration for researchers.

Yours Sincerely
The Organizing Committee

All rights reserved. No part of contents of this paper may be reproduced, processed or transmitted in any form or by any means without the written permission of Trans Tech Publications Ltd, www.scientific.net. (#0-09/02/26,15:20:24)

Address of the Conference Chair

Dr. Rafael Santiago
Senior Director Technology
Innovation Institute (TII)

As the Conference Chair, I am delighted to introduce these proceeding, a collective testament to the exceptional research, ingenuity, and collaboration that define our field.

ICPS7 brings together a vibrant community of engineers, scientists, and innovators dedicated to advancing the science and application of protective structures. This proceeding reflects the dynamic exchange of ideas, the depth of exploration, and the global relevance of the work being presented. It offers a snapshot of where we stand today and, more importantly, where we are headed.

In an era defined by complex challenges and rapidly evolving threats, the role of protective structures has never been more critical. This conference provides a vital platform for sharing new findings, methodologies, and technologies to help shape safer and more resilient societies. The work represented in these abstracts highlights our community's commitment to advancing the frontiers of knowledge and delivering real-world impact.

I would like to extend my deepest appreciation to all the authors, organisers, reviewers, keynote speakers, sponsors, participants and staff for their dedication and support. Your efforts make ICPS7 a truly international and inspiring event.

I invite you to explore the pages ahead with curiosity and enthusiasm. May they spark new ideas, foster meaningful collaborations, and inspire continued excellence in our shared pursuit of innovation and safety.

Warm Regards,
Dr. Rafael Santiago

Acknowledgement

We would like to extend our deepest gratitude to H.E. Faisal Al Bannai, Dr. Najwa Aaraj and Prof. Vincenzo Giannini for their generous and unwavering support for ICPS7. We sincerely appreciate the International Association of Protective Structures (IAPS) for endorsing this conference in Abu Dhabi and the Advanced Technology Research Council (ATRC). Special acknowledgement to Prof. Zhongwei Guan and Geeta Gidwani for their invaluable support throughout the planning and organisation of the event. Finally, we would like to recognise and thank everyone who contributed to the success of the conference, including our dedicated conference members, authors, and scientific committee, for their commitment and hard work.

Conference Committee

Local Committee Members

Dr. Rafael Santiago
Conference Chair
Senior Director in Material Research Certre
Technology Innovation Institute, UAE

Dr. Alia Ruzanna Aziz
Program Chair
Senior Reseacher,
Technology Innovation Institute, UAE

Omar Ba Nabila
Co-Program Chair
Senior Engineer
Technology Innovation Institute, UAE

Andrew Chopra
ICPS7 Event Manager
Senior Manager – Events
Technology Innovation Institute, UAE

IAPS Steering Committee

Prof. Mark Stewart, University of Technology Sydney, Australia
Prof. James S. Davidson, Auburn University, United States of America
Prof. Piotr Sielicki, Poznan University of Technology, Poland
Prof. Qin Fang, Army Engineering University of PLA, China
Prof. Norbert Gebbeken, University of the Bundeswehr Munich, Germany
Prof. Hong Hao, Guangzhou University, China / Curtin University, Australia
Prof. Qingming Li, University of Manchester, England, United Kingdom
Prof. Zhong-Xian Li, Tianjin University, China
Prof. Jeffrey Packer, University of Toronto, Canada
Prof. Masuhiro Beppu, National Defense Academy, Japan
Prof. David Yankelevsky, Technion-Israel Institute of Technology, Israel
Dr. Rafael Santiago, Technology Innovation Institute, United Arab Emirates

Scientific Committee

- **Prof. Wesley Cantwell**, Khalifa University, United Arab Emirates
- **Prof. Guoxing Lu**, Swinburne University of Technology, Australia
- **Prof. Dora Karagiozova**, Bulgarian Academy of Sciences, Bulgaria
- **Prof. Xiaowei Chen**, China Academy of Engineering Physics, China
- **Prof. Dong Ruan**, Swinburne University of Technology, Australia
- **Prof. Marcílio Alves**, University of São Paulo, Brazil
- **Prof. Steeve Chung Kim Yuen**, University of Cape Town, South Africa
- **Prof. Jin Zhou**, Xian Jiaotong University, China
- **Prof. Magnus Langseth**, Norwegian University of Science and Technology, Norway
- **Prof. Sandro Amico**, Federal University of Rio Grande do Sul, Brazil
- **Prof. Victor Shim**, National University of Singapore (NUS), Singapore
- **Prof. Avraham Dancygier**, Technion - Israel Institute of Technology, Israel
- **Prof. Flavio Silva**, Pontificia Universidade Católica do Rio de Janeiro, Brazil
- **Prof. Jian Xiong**, Harbin Institute of Technology, China
- **Prof. Guangyong Sun**, Hunan University, China
- **Prof. Tore Borvik**, Norwegian University of Science and Technology, Norway
- **Prof. Francois Boussu**, GEMTEX ROUBAIX, France
- **Prof. Michael Seica**, University of Toronto, Canada
- **Prof. Yanchao Shi**, Tianjin University, China
- **Prof. Yang Ding**, Tianjin University, China
- **Prof. Jiabao Yan**, Tianjin University, China
- **Prof. Licheng Guo**, Harbin Institute of Technology, China
- **Prof. Yanhong Chen**, Harbin Institute of Technology, China
- **Prof. Xianfeng Zhang**, Nanjing University of Science and Technology, China
- **Prof. Daniel Ambrosini**, University of Cuyo, Mendoza, Argentina
- **Prof. Yong Lu**, University of Edinburgh, Scotland, United Kingdom
- **Prof. Ser Tong Quek**, National University of Singapore
- **Prof. Zhongwei Guan**, University of Liverpool, United Kingdom
- **Assoc. Prof. Vegard Aune**, Norwegian University of Science and Technology, Norway
- **Assoc. Prof. Jian Cui**, Tianjin University, China
- **Dr. Waleed Ahmed**, United Arab Emirates University, UAE
- **Dr. Teresa Fras**, French-German Research Institute of Saint-Louis (ISL), France
- **Dr. Ehsan Noroozinejad**, University of British Columbia (UBC), Canada
- **Dr. Leopold Kruszka**, Military University of Technology, Poland
- **Dr. Ziwen Xu**, Harbin Institute of Technology, China
- **Dr. Hasan Al Rifaie**, Poznan University of Technology, Poland
- **Dr. Mohd Zuhri Mohamed Yusoff**, University Putra Malaysia, Malaysia
- **Dr. S Kanna Subramaniyan**, Universiti Tun Hussein Onn, Malaysia
- **Dr. Lei Yang**, Johns Hopkins University, United States of America
- **Dr. Tomas Gajewski**, Poznan University of Technology, Poland
- **Alexander Stolz**, Fraunhofer EMI, Germany

Sponsors & Exhibitors

Gold Sponsors

Ansys

THIOT
INGENIERIE

ANSYS “Founded in 1970, Ansys is a world leader in numerical simulation, specializing in the development of advanced software solutions that enable engineers to virtually design, test and validate products before they go into production. Its tools cover various fields such as fluid mechanics, electromagnetism and structural dynamics.

Through a unique expertise and more than 30 years of experience, THIOT INGENIERIE is a world leader for studying the behavior of materials in fast dynamics conditions. With more than 30 experts we develop and supply fast dynamics equipment for research centers and manufacturers all over the world.

THIOT INGENIERIE also boasts the first private Shock Physics laboratory, with cutting-edge test equipment and metrology solutions. Its combination with our know-how in numerical calculation aims to study the behavior of materials and structures under shock stress (crashes, ballistic impacts, blasts, etc.) in the minutest detail to enable our customers to develop the most reliable products capable of handling the threats they face

Exhibitors & Publishing Partner

Photron

ASI®

Scientific.Net
Publisher in Materials Science & Engineering