

## Resume of Kang Hai TAN BSc(Eng), PhD, PEng



Dr Tan Kang Hai obtained BSc (Eng) (First class with Distinction) in 1986, and then PhD with the UK scholarship in 1989, from Manchester University. He won the following awards during his undergraduate studies, viz. Ashbury Scholarship, Taylor Woodrow Prize, Gilbert Cook Bequest, Phillips Noel Bedson Award and Overseas Research Scholarship UK Science & Engineering Research Council. Prior to joining NTU, he worked as a graduate engineer in Ove Arup & Partners, UK. He has practical experience for designing steel, reinforced concrete, composite steel and masonry structures. He won the UK Institution of Structural Engineering Henry Adams Award in May 1989 for original research work in structural sandwich panels subjected to lateral loading. He was promoted to full professorship in Aug 2011.

### Research collaboration with SCDF, JTC, DSTA and MHA

He was Associate Chair (Research) for the school of CEE from 31 Oct 2014 to 31 May 2017, and is concurrently Director of Protective Technology Research Centre and Co-Director of Transportation Research Centre. He has close to 180 SCI top-tier international journal paper publications and close to 180 international conference articles on structures. His H-index from SCI Web of Science is 25 and from Scopus is 30. Currently, Professor Tan has secured a National Research Foundation (NRF) funding of about \$6 Million to embark on a research project which aims to provide an integrated fire safety assessment of underground developments in Singapore which involved evacuation analysis, fire modelling, heat transfer analysis, structural analysis and fire detection/suppression analysis. The research project is in joint collaboration with SCDF, JTC and DSTA with the aim of development a safe, robust and cost-effective design for Singapore's mega underground cavern developments. He plays a leading role to propose recommendations to SCDF on the development of a safe, underground cavern. His research theme consistently focuses on structural components or sub-assemblages subject to extreme loading such as fire or blast condition that may precipitate progressive collapse. Prof Tan has also been developing a numerical tool FEMFAN3D to simulate progressive collapse for reinforced concrete structures, which is a main deliverable in a DSTA project. He conducted realistic scale laboratory tests on progressive collapse resistance of structures, structures in fire, and numerical simulations using his own developed software FEMFAN3D. He has graduated 24 PhD and 16 MEng students. He has taught DSTA and MHA engineers how to use FEMFAN3D to predict progressive collapse of RC frames. He is also mainly involved in the drafting of a Singapore design code to mitigate progressive collapse of structure. As Principal Investigator, he has research projects funded from the Ministry of Education, Defence Science Technology Agency, Building Construction Authority and University Research Grants.

### Professional short courses

A registered Professional Engineer in Singapore since 1996, he gives regular 2-day short courses in Singapore, Malaysia and Hong Kong. He has conducted the following short courses for local industry jointly organized through BCA Academy, PTRC, HDB learning hub and ACES, viz. EC0 - Basis of structural design, EC1 - Actions on structures, EC2 - Design of concrete structures, EC3 - Design of steel structures and EC4 - Design of composite steel and concrete structures, EC1 Part 1-2: General actions – Actions on structures exposed to fire, EC2 Part 1-2: Structural fire design for concrete, EC3 Part 1.2 – Structural fire design for steel, EC4 Part 1-2– Structural fire design for composite steel. Besides, Prof Tan has also been invited to conduct 2-day EC2 short courses by TYLin, AECOM, Mott MacDonald, Meinhardt, KTP, P&T Consultants, Engineers & Partnership, CPG, Sembcorp, RSP Architects & Engineers, Ove Arup, Land Transport Authority, Public Utilities Board, etc. This establishes his leadership in Civil and Structural engineering in Singapore.

### Technical Committees

Professor Tan Kang Hai has been SCDF's strategic partner since Nov 2001, when he obtained a grant from the Building & Construction Authority for a research project on performance-based fire resistance design guide for steel structures. The work was in collaboration with SCDF from 1 Nov 2001 – 31 Dec 2004. Apart from software development and member tests under fire conditions, he developed a local design guide for structural fire engineers. Professor Tan was Chairman of that technical committee. Since then, Professor Tan has been very active in promoting the use of performance-based approach to structural fire applications. During early 2000s, Professor Tan was involved in the drafting of performance-based fire code chaired by FSSD. He was also a member of Fire Code Review Committee on "Code of Practice for Fire Precautions in Buildings 2002". Professor Tan is a Member of Fire Safety Appeals Board Committee since 2004 where he is required to assess fire safety appeals to the Minister on a modification or waiver of fire safety requirements. He is also a member of the Selection Panel for certifying Fire Safety Engineers (FSEs) since the inception of this accreditation scheme in 2005 by FSSD. He chaired four technical sub-committees on the development of National Application Documents for Singapore, viz. SS EN 1990 Part 1-7, SS EN 1991 Part 1-2, SS EN 1992 Part 1-2, SS EN 1993 Part 1-2, and SS EN 1994 Part 1-2. He is in the HDB Civil & Structural Engineering Advisory Panel, invited by Building Construction Authority as a member of (a) International Panel of Experts on Construction Productivity and Prefabrication Technology, and (b) Construction Productivity and SkillsFuture Tripartite Committee.

### Selected Consultancy

Prof Tan has been actively involved in structural fire engineering work. To name a few, he worked with Maunsell (now known as AECOM) on Tuas MRT viaducts for some fire scenarios. He was consultant to HDB for the entire upgrading of software SECAD from BS8110 to EC2. He was consultant to Maunsell and CAAS on the upgrading of Changi Terminal 1 Airport. He has over 28 years of research, teaching, technical committee involvement and consultancy experience working with government agencies and industries.