

# Jason Yunlong Liu

## PhD, PE, FPE, CPEng, FIEAust

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<b>CANDIDATE NAME</b>	Jason Yunlong Liu
<b>EXPERTISE FIELD</b>	Tunnel Ventilation/Fire Life Safety
<b>CURRENT WORK LOCATION</b>	Bellevue, Washington, USA 98004
<b>CURRENT JOB TITLE</b>	Senior Technical Advisor
<b>NATIONALITY</b>	Australia
<b>PERMANENT RESIDENT</b>	United States of America

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### PROFILE

Yunlong is a Senior Technical Advisor specialised in tunnel ventilation, fire & life safety design and CFD analysis on various engineering projects. Having obtained his Ph.D in mechanical engineering in 1998, he has also involved in research at the University of Hawaii in USA, Delft University of Technology in The Netherlands and the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. Yunlong is a PE in Mechanical Engineering and Fire Protection licensed in Washington (#51698), New York (#106214), Texas (#146767) and Georgia (#050633), USA, and a Chartered Professional Engineer of Engineers Australia. He is registered at National Engineer Registrar (NER) in Mechanical Engineering and Fire Safety, and a certifier in Mechanical Engineering and Fire Safety registered in New South Wales State, Victoria State and Queensland State, Australia.

Yunlong has led the concept design of the tunnel ventilation system and conducted detailed ventilation and fire safety design for the highway and railway tunnels, and he has led the certification process of elevated, at grade and underground railway station design of Riyadh Metro on behalf of the owner in Saudi Arabia, and he was the lead for the tunnel ventilation and fire and life safety design of Melbourne Metro on behalf of the builders. Yunlong has contributed to 100+ infrastructure, commercial, industrial, and residential developments in Australia, Canada, China, New Zealand, Saudi Arabia, Switzerland, Turkey and USA.

He has extensive knowledge on performance-based engineering design, and he has validated CFD software tools to examine a design and give advice on how to improve a system which does not comply with the DtS (Deemed-to-Satisfy) provisions of the Building Code. He also researched highway tunnel fire and life safety with Commonwealth Scientific & Industrial Research Organisation (CSIRO) in Australia and Parsons Brinckerhoff (PB), USA.

In 2019 Yunlong has been appointed as a guest professor at Peking University of the People Republic of CHINA. He was elected to be a Fellow of the Institution of Engineers Australia (FIEAust).

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## AFFILIATIONS & LICENSING

- Member of ASHRAE Standard Project Committee 217, Cognizant TC: 5.9, Enclosed Vehicular Facilities, 2022.
  - Standing Committee member of the NCEES Fire Protection Exam Development, SFPE.
  - PE, Registered Professional Engineer in Mechanical Engineering and Fire Protection Engineering licensed in Washington (#51698), New York (#106214), Texas (#146767), Georgia (#050633), USA.
  - Fellow & Chartered Professional Engineer (FIEAust, CPEng, MIEAust #2790780) – Engineers Australia.
  - National Engineering Register (NER) in Mechanical & Fire Safety Engineering (No. 2790780) – Engineers Australia.
  - Accredited Certifier (# 3255) in Mechanical Services (C9) & Fire Safety Engineering Compliance (C10) - Building Professionals Board (NSW), Australia.
  - RPEQ (# 18672) in Mechanical & Fire Safety at BPEQ, Queensland, Australia.
  - Registered Building Practitioner (RBP) in Mechanical & Fire Safety (EF# 46142, EM# 58027), Victoria Building Practitioners Board (VBA), VIC, Australia.
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## EDUCATION & QUALIFICATIONS

Post Doctoral Fellow (Mechanical Engineering) 1999  
University of Hawaii at Manoa, Honolulu, Hawaii, USA

Ph.D. (Mechanical Engineering) 1998  
Tsinghua University, Beijing, CHINA

B.Sc., M.Sc. (Mechanical Engineering) 1987, 1990  
China University of Petroleum, Shandong & Beijing

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### Editorial Board Member/Reviewer for Journals:

- Building & Environment.
  - Int Journal of Ventilation.
  - Fire Technology.
  - Safety & Fire Technology (Advisory Board)
  - Fire Safety Journal.
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## EMPLOYMENT HISTORY

- Sr. Technical Advisor, HNTB Corporation, Seattle, Washington, USA, April 15, 2019 –
- Sr. Fire Safety Engineer, Tetra Tech (NDY), Sydney, NSW, Australia, Nov 6, 2018 – Jan 20, 2019
- Ventilation & FLS lead, Lendlease (CYP) – Melbourne Metro, Australia, May 21, 2018 – Nov 2, 2018
- Ventilation & FLS Specialist, PARSONS Ltd, Riyadh, Kingdom of Saudi Arabia, May 31, 2017 – May 14, 2018
- Sr. Fire Safety Engineer, AED Consulting, Sydney, Australia, Nov 21, 2016 – March 23, 2017

- Sr. Fire Safety Engineer, Jensen Hughes (Stephen Grubits & Associates), Sydney, Australia, May 4, 2016 – October 4, 2016
  - Sr. Project Engineer, HNTB Corporation, Seattle, Washington, USA, September 6, 2011 – April 30, 2016
  - Fire Safety Engineer, Stephen Grubits & Associates, Sydney, Australia, May 2011 – September 2, 2011
  - Tunnel Ventilation Engineer, WSP (Parsons Brinckerhoff), Sydney, Australia, November 2007 – May 2011
  - Fire Safety Engineer, Exova Warrington Fire Consulting, Sydney, Australia, Nov 2016 – Nov 2017
  - Sr. Consultant/Research Scientist, CSIRO, Sydney, Australia, November 2003 – November 2006
  - Sr. Consultant/Research Scientist, Swiss Federal Institute of Technology, Zurich, Switzerland, Dec 2000 – Nov 2003
  - Sr. Research Fellow, Delft University of Technology, Netherlands, December 1999 – November 2000
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## EMPLOYMENT DETAILS

### HNTB Corporation, Seattle, USA Senior Technical Advisor

April 15, 2019 – Present

Consulting projects (April 2019 – present):

Review and Independent verification of N 35<sup>th</sup> St & W Capitol Drive Storm Water drainage system, (Projected to start April, 2023 - ), Milwaukee, WI, USA.

Fire Protection Design and Analysis for MARTA Clayton County Bus Maintenance Facility, GA, 2022 – 2023, Georgia, USA.

SR507 Tunnel fire safety design, reviewer, Dec 2022, Washington State Department of Transportation, WA, USA.

New York City Holland Tunnel & Lincoln Tunnel fire & Life safety upgrade for New Energy Vehicles, May 2022 – present, NY, USA.

CTA Chicago California Station fire protection design, May 2022 - present, Chicago, IL, USA.

Seattle I-90 MIT and MBT Tunnel fire suppression system upgrade design, April 2022 – present, Seattle, Washington, USA.

Sepulveda Rail Tunnel Emergency Ventilation SES Analysis, March 2022 – April 2022, California, USA.

Chicago O'Hare Airport APM tunnel ventilation design, March 2021 – ongoing, IL, USA

Lynnwood Link Light Rail Project Fire Protection Analysis, August 2020 – ongoing, Washington, USA.

Xpress West tunnel - Tunnel Ventilation requirement, October 2020 – ongoing, California-Arizona, USA.

Ronald Reagan Blvd Widening Pedestrian Tunnel, September 2020. Texas, USA.

WSDOT, Review of Tunnel ventilation and Fire emergency evacuation solution for SR 520 Portage Bridge-Roanoke Lid, Seattle, WA, USA. May 2020 - ongoing. As a fire & life safety engineer of the General Engineering Consultants, I assisted the performance-based analysis of the ventilation design. Client: WSDOT, USA.

Philadelphia Airport Fort Mifflin Road and Rail Tunnel fire engineering, Pennsylvania, December 2019 – January 2020. Duty: As a design engineer of the General Engineering Consultants (GEC), I proposed fire engineering strategy, lead the fire engineering analysis to confirm the ventilation and fire safety engineering design solution. Client: City of Philadelphia, Pennsylvania, USA.

Fire Services advice for the San Dieguito Double Track and Platform – California, USA, October – December 2019. Duty: As a design engineer of the General Engineering Consultants, I performed analysis of the feasibility of the piping design for the standpipe and fire protection design. Client: City of Del Mar, California, USA.

BNSF Pioneer tunnel ventilation conceptual design, Washington State, USA. September 2019. Duty: As a designer, I contributed to the design and review of the ventilation strategy on behalf of the general engineering consultants. Client: Washington State, USA.

Sound Transit West Seattle and Ballard Link Extension Project (WSBLE), Advanced conceptual engineering related to fire & life safety engineering, Washington, USA. June 2019 - 2020. Duty: As a designer, I contributed to the ventilation and fire & smoke control strategy design, provided detailed analysis for the existing connection station – Westlake Station, as well as the proposed new stations of the project on behalf of the general engineering consultants. Client: Sound Transit, WA, USA.

WSDOT, Review of Tunnel ventilation and Fire emergency evacuation solution for SR 520 Montlake Bridge Lid, Seattle, WA, USA. May 2019 - 2020. Duty: As a consultant to the project owner, Washington State Department of Transportation (WSDOT), I provide advice for certifying the ventilation and fire emergency evacuation design solution submitted by the general engineering consultants. Client: WSDOT, Washington, USA.

Silicon Valley Transit Authority (VTA), BART (WP – Diridon Arena - San Jose downtown - Alum Rock – EP) tunnel ventilation design and review, California, USA. May 2019 - 2020. Duty: I provided review for the emergency ventilation of the proposed rail tunnel on behalf of the general engineering consultants. Client: VTA & BART, California, USA.

Texas DOT, Houston Highway I-45/I-69 tunnel ventilation concept design, Texas, USA. April – December 2019. Duty: I supervised the design and analysis of the Request for Proposal (RFP) design as a general engineering consultant. Client: Texas DOT, USA.

Economic Development Commission (EDC) of New York, Ventilation and fire safety design for the Sunny Side Yard of New York Long Island rail facility depot, New York, USA. April 2019 - 2020. Duty: As a designer of the general engineering consultants, I provided consultants advice on fire hazards analysis, fire & life safety evacuation and emergency ventilation, and had led the analysis to confirm the proposed solution. Client: Economic Development Commission (EDC) of New York, USA.

Illinois DOT, Chicago NLSD highway tunnel ventilation concept design, Illinois, USA. April – May 2019. Duty: As a designer of the general engineering consultants, I provided preliminary advice on the fire engineering strategy for the highway tunnel ventilation and fire safety design. Client: Illinois DOT, USA.

**Tetra Tech (Norman Disney & Young), Sydney, Australia    November 6, 2018 – January 20, 2019**  
**Senior Fire Safety Engineer**

Consulting projects (November 6, 2018 – Jan 20, 2019):

235 St George Terrance, Perth, WA, Fire Engineering Consultants Advice, Client: WeWork, Australia. (December, 2018).

Global Switch Data Center, 400 Harris Street, Ultimo, NSW, Australia. I provided general consultant's advice on the fire engineering solution of the building facades. Client: Global Switch Data Center, NSW, Australia.

60 Castlereagh Street, I provided Fire Engineering Consultants Advice. Client: WeWork, Sydney, NSW, Australia.

Level 18 development at 345 George St, Sydney. Duty: I provided fire engineering advice. Client: WeWork, NSW 2000, Australia.

P18-028 - Brookvale B-Line Foot Bridge Fire Engineering Solution. Duty: I provided fire engineering advice. Client: Westfield Shopping Centre, NSW, Australia.

1 Sussex St, I provided Fire Engineering Consultants Advice, Client: WeWork, Sydney, NSW, Australia.

320 Pitt St, I provided Fire Engineering Consultants Advice, Client: WeWork, Sydney, NSW, Australia.

Level 12 of 50 Goulburn St, I provided Fire Engineering Consultants Advice, Client: MPA, Sydney, NSW, Australia.

Castle Hill Bunning Warehouse, I provided Fire Engineering Consultants Advice, Client: Bunnings Group, NSW, Australia.

Mittagon RSL Tabatinga upgrade project, I provided Fire Engineering Consultants Advice, Client: Mittagon RSL Club, NSW, Australia.

**Lendlease, Melbourne, Australia  
Ventilation, Fire & Life Safety Lead**

**May 21, 2018 – Nov 2, 2018**

Consulting projects (May 21, 2018 – 2 November 2018):

Melbourne Metro Tunnel & Stations Ventilation - detailed design & certification on behalf of the builder, the project includes five underground stations (Arden, Parkville, CBD South, CBD North, Domain), tunnels, eastern and western portals, etc. (May 21 – October, 2018). Duty: Review and certify the ventilation, fire & life safety design submitted by the general engineering consultants. Client: Melbourne Metro Rail Authority (MMRA), Victoria, Australia.

Melbourne Metro Tunnel & Stations Fire & Life Safety - detailed design & certification on behalf of the builder, the project includes five underground stations (Arden, Parkville, CBD South, CBD North, Domain), tunnels, eastern and western portals, etc. (May 21 – October 2018). Duty: Review and certify the ventilation, fire & life safety design submitted by the general engineering consultants. Client: Melbourne Metro Rail Authority (MMRA), Victoria, Australia.

Key Responsibilities:

- Organize stakeholder reviews of the concept design delivered by the contractors (WSP/Acardis/Arup/Hassell).
- Planning for the deliverables of the Tunnel ventilation package and the Fire & Life Safety package.
- Manage and lead the detailed design of Tunnel ventilation, Fire & Life Safety packages.
- Propose and execute the cost-savings options on ventilation and fire & life safety design.

**Parsons Ltd, Riyadh, Saudi Arabia (KSA)  
Fire & Life Safety Specialist**

**May 31, 2017 – May 14, 2018**

Consulting projects (May 31, 2017 – May 14, 2018):

Package 1, Metro Line #1 and Line #2, As a member of PMCM, I worked on Riyadh Metro Tunnel & Station Fire & Life Safety Design review & certification on behalf of the owner, the project includes about 44 stations (including elevated, at grade, shallow underground and deep underground stations), Park & Ride, substations and depots (May 31, 2017 - May 14, 2018), the review includes the contract and code compliance, fire protection, smoke management, egress analysis, fire resistance ratings, etc. Client: ArRiyadh Development Authority (ADA), Riyadh, KSA.

Package 2, Metro Line #3, As a member of PMCM, I worked on Riyadh Metro Tunnel & Station Fire & Life Safety Design review & certification on behalf of the owner, the project includes more than 22 stations including elevated, shallow underground and deep underground stations, and two depots at grade (June, 2017 – May 2018), the review includes

the contract and code compliance, fire protection, smoke management, egress analysis, fire resistance ratings, etc. Client: ArRiyadh Development Authority (ADA), Riyadh, KSA.

Key Responsibilities:

- Provide technical review comments to comment resolution sheets (CRS) on contract and code compliance, fire hazards analysis, smoke management, egress analysis, fire resistance ratings, etc;
- Lead the drawings page-turn review meetings with the designers and approve the design on behalf of the project owner;
- Attend Civil Defence meetings for certification by the regulatory authority.

Other activities:

- Delivered a training seminar on CFD application, organized by Institute of Civil Engineers, Riyadh, KSA, May 8<sup>th</sup>, 2018.

**AE&D Consulting, Sydney, Australia**  
**Senior Fire Safety Engineer**

**November 21, 2016 – March 23, 2017**

Consulting projects (November 2016 – March 23, 2017):

Fire Engineering Report (F2061) for the Fire Hydrant non-compliance location for the Building at 19-21 Eve Street, Erskineville, NSW 2154, Australia (March, 2017).

Fire Engineering Report (F2042) for Powerhouse Museum Castle hill, NSW 2154, Australia (March, 2017).

Fire Engineering Report (F1990) for Bathers Apartments at 29-35 Prince St, Cronulla, Australia (March, 2017).

Fire Engineering Report (F2036) for fire hydrant located beside carpark driveway at 361-363 Sussex St, City of Sydney, NSW 2009, Australia (February, 2017).

Fire Engineering Report (F2039) for building at 4 Innesdale Road, Wollie Creek, NSW, Australia (February, 2017).

Fire Engineering Report (F2045) for single exit for the building at 18 Balfour Rd, Rose Bay, NSW 2029, Australia (February, 2017).

FEBQ (F2001) for 771-775 Victoria Road, Ryde, NSW, Australia (January, 2017). Client: Chiwayland Pty Ltd, Australia.

Fire Engineering Report (F2044) for class 1 Granny flat at 26 Boomerang St, Haberfield, NSW 2045, Australia (February, 2017).

Fire Engineering Report (F1926) for 35 Campbell Street (181 Church St), Parramatta, NSW, Australia (January - March, 2017). Client: Trinity Reality Pty Ltd, Australia.

Fire safety engineering analysis and assessment (F2030) on the Building at Lot 716, Mittabah Lodge, Bobuck Lane, Thredbo, NSW 2625, Australia (November, 2016 – December 2016). Client: SideCut P/L Australia.

Fire safety engineering analysis and assessment (F2032) on the 149-161 O’Riordan Street, Mascot, NSW, Australia (January, 2017). Client: Skyton Developments NSW Pty Ltd, Australia.

Fire Engineering Brief (F1926) for 35 Campbell Street (181 Church St), Parramatta, NSW, Australia (November, 2016 – December 2016). Client: Trinity Reality Pty Ltd, Australia.

Fire Engineering report (F1965) for Duncan Thompson Stand, North Sydney Oval; Players Amenity Upgrade, NSW, Australia (November, 2016 – December 2016). Client: North Sydney Council, Australia.

Fire Engineering report (F2002) for Building at 8 and 10 Bligh Street, Randwick, NSW, Australia (November, 2016 – December 2016). Client: The Owners – Strata Plan No 6979.

FEBQ (F1115) for 289 King St, Mascot, NSW, Australia (November, 2016 – December 2016). Client: Futuroscope Energy Pty Ltd, Australia.

Fire Engineering report (F1982) for the proposed development At 6 Addison St, Shell Harbour, NSW Australia. (November, 2016 – December 2016). Client: Hyperbuild, Australia.

Other activities:

- Presentation at Tsinghua University: Tunnel ventilation and fire life safety design of Seattle SR99 Tunnel. November 8, 2016, Beijing, PR China.

**Jensen Hughes (Stephen Grubits & Associates), Sydney, Australia May 4, 2016 – October 4, 2016**  
**Senior Fire Safety Engineer**

Consulting projects (May 2016 – October 2016):

SES Airflow study and CFD analysis of fire life safety for the Forrestfield Airport Link tunnel, Perth. (August - October, 2016). Duty: Tenability analysis, simulation of mechanical ventilation system developed airflow using 1D network model. Client: Geodata on behalf of Public Transportation Authority, Western Australia.

Tender design and CFD analysis for the smoke exhaust system of Melbourne Western Distributor road tunnel. Melbourne, Victoria, Australia. (August – September 2016). Client: CPB John Holland on behalf of the Victoria state government, Australia.

Review of Fire Safety Engineering report for the Units at 25-27 Newdegate Street, Greenslopes, Brisbane, Queensland, Australia. (August, 2016). Client: Newdegate KB Group Pty Ltd, Queensland, Australia.

Sydney WestConnex Phase I - M4-East road tunnel fire and life safety analysis, Sydney, NSW, Australia (July - August 2016). Duty: Tunnel tenability CFD analysis. Client: New South Wales state government, Australia.

Development of fire engineering report for the building tower at 122 Saunders Street, Pyrmont, NSW, Australia. (July-August, 2016). Client: CMS Projects Pty Ltd. Australia.

Sydney NorthConnex road tunnel, Phase I Project, NSW, Australia. (May-July, 2016), Tunnel Fire and Life Safety analysis. Client: NSW State government, Australia.

Development of LAHC manual on separation of buildings. (July, 2016). Development of thermal radiation heat flux criteria for identifying measures for the protection of openings for class 1a, 2 and 3 buildings. Client: the Department of Family & Community Services, NSW Land and Housing Corporation, Australia.

Perth – Butler Tunnel fire and life safety analysis – Tunnel 2/4 and Tunnel 5 for the emergency ventilation analysis and report. (June – July, 2016). Client: Public Transportation Authority, Western Australia.

Peer review of fire engineering design of 38 Wharf Street, Brisbane, Queensland, Australia. (May 2016), Client: MCD & Hutchinson Builders, Queensland, Australia.

Fire engineering report for 10 Strudee Parade, Dee Why, NSW, Australia. (May - June, 2016). Client: Dynamic Property Services for the Owners of SP 83746, NSW.

Fire engineering design for St Vincent's Private Hospital redevelopment, Toowoomba, Queensland, Australia. (May – July 2016). Client: The Pulse Architecture on behalf of SVPH, Queensland, Australia.

Fire engineering design report for level 2 loading dock of 126 Philip Street, Sydney, NSW 2000, Australia. (May – June 2016). Client: Eastview Commercial, Sydney, Australia.

Fee proposal for fire engineering design of Cahill Gardens, Wollli Creek, NSW. (May 2016). Client: TQM Design & Construction Pty Ltd, NSW, Australia.

Other activities:

- Presentation at SGA monthly seminars: Tunnel ventilation and fire life safety design of Seattle SR99 Tunnel. July 12, 2016, Sydney, Australia.

Consulting projects (September 2011 – April 2016):

Ventilation and Fire safety preliminary pre-tender design for the New York 2<sup>nd</sup> Avenue Subway Line, Phase II project. New York, USA. (March – April, 2016), Client: Metropolitan Transportation Authority (MTA), NY, USA.

Tunnel and Station Ventilation and Fire Life Safety preliminary design for DART D2 Dallas Area Rapid Transit light rail project, Dallas, TX, USA. (February - April, 2016), Client: Dallas Area Rapid Transit (DART), Texas, USA.

Fire Smoke Ventilation CFD Evaluation for SEPTA AT&T Pattison Station and Jefferson Station, Philadelphia, Pennsylvania, USA. (October 2015 – February 2016). Client: the Southeastern Pennsylvania Transportation Authority (SEPTA), Pennsylvania, USA.

Review of tunnel ventilation design report and the fire/life safety design report for the proposed Baltimore and Potomac rail tunnel, Baltimore, Maryland, USA. (September – October, 2015). Client: National Railroad Passenger Corporation, USA.

Review of the East link Bellevue Downtown Tunnel ventilation and fire life safety design report. (September 2015) Client: HNTB-Jacob-HMM JV for Sound Transit, WA, USA.

Detailed ventilation design and performance analysis for the underpass tunnel crossing I-95/SR 528 in Florida, USA. (July - September 2015). Client: All Abroad Florida RailRunner, FL, USA.

The Detailed Analysis of the Casey Overpass Forest Hills Commuter Station Fire Life Safety System, MassDOT, MA (April – June 2015) Detailed fire life safety CFD assessment. Client: The Massachusetts Department of Transportation (MassDOT), USA.

Boston South Station Expansion Project - Ventilation and Fire Safety Engineering, Boston, MA, USA (February - June 2014). Client: The Massachusetts Department of Transportation (MassDOT), USA.

Performance-based structural fire safety thermal analysis of Presidio tunnels, San Francisco, CA, USA (April – June, 2014). Client: San Francisco County Transportation Authority, Presidio Trust, and the National Park Service, CA, USA.

Independent opinion of Passive Fire Protection (PFP) design for Railway Bosphorus Tube Crossing, Tunnels and Stations, Istanbul, Turkey (January 2014). Client: Taisei/GN JV.

Review of ventilation and water mist fire suppression design for the Queens Midtown Tunnel rehabilitation, New York, USA (December 2013 – January 2014). Client: Triborough Bridge and Tunnel Authority (TBTA), NY, USA.

Structural fire safety thermal analysis and occupants egress analysis for the Tunnel at Fort Lauderdale-Hollywood Intl Airport, Florida, USA (June – December, 2013). Client: the Tunnel at Fort Lauderdale-Hollywood Intl Airport, Florida, USA

Detailed fire safety analysis of Harlem River Lift Bridge (HRLB), New York City, USA (May – June 2013). Client: MTA Metro North Railroad, Manhattan, New York, USA.

Pre-award ventilation and fire safety concept design for Regional Connector Transit Corridor Project – 7<sup>th</sup>/Metro Center Station, 2<sup>nd</sup>/Hope St Station, 2<sup>nd</sup>/Broadway Station, 1<sup>st</sup>/Central Station and the associated tunnels in Los Angeles, USA (January – June, 2013). Provided advice for the ventilation design of the four rail stations and four tunnel zones. Client: Los Angeles County Metropolitan Transportation Authority (Metro), USA.

San Francisco Bay Area Rapid Transit (BART) – Warm Springs Extension Line Railway Station Ventilation, California, USA (January – March 2013), Client: BART. Conducted performance analysis for the natural ventilation design of the Warm Springs Station, USA.

Independent Verification Analysis for the Istanbul Strait Road Tube Crossing Project (ISRTCP) – Tunnel ventilation and fire safety (November 2012 – December 2013). Client: Ministry of Transportation, Republic of Turkey.



Independent review of the I-90 Two Way Transit and HOV - CFD Modelling Analysis (for Mt Baker Ridge Tunnel and Mercer Island Tunnel), Seattle, USA (November - December 2012). Client: Washington State Department of Transportation, USA.

Preliminary Analysis of Emission Rate and Air Demand for the Chicago 103<sup>rd</sup> Bus Maintenance Facility, IL, USA (November - December 2012). Client: Chicago Transportation Authority (CTA), USA.

Honolulu Rail Transit project (H RTP) maintenance & Storage Facility Atrium fire ventilation system design, HI, USA (October 2012). Client: Honolulu Authority for Rapid Transportation, HI, USA.

Detailed design of Seattle Alaskan Way Viaduct Replacement Program SR99 road tunnel ventilation and fire engineering, WA, USA (September 2011 – November 2012). Provided fire life safety detailed design and analysis, as well as performance analysis for the structural fire durability of the 3km long road tunnel in downtown Seattle, Client: Washington State Department of Transportation (WSDOT), USA.

Independent review of Presidio North Bound Battery Tunnel (NBBT) Mechanical system, CA, USA (July 2012). Client: Golden Link Concessionaire, CA, USA.

Pre-award concept design of 11km long Evergreen Line Light Rail Tunnel (February – April, 2012). Client: Province of British Columbia, Canada. Propose and analysed the ventilation and fire life safety system for the light rail tunnel that connect the Douglas College Station to Lougheed town centre in the city of Coquitlam, BC, Canada.

SES and CFD ventilation analysis for New York City Transit Station – 34<sup>th</sup> St/Herald Square, 14<sup>th</sup> St/Union Square and 47-50<sup>th</sup> St/Rockefeller Center (December 2011 – Jan 2012), Client: New York City Transit, NY, USA.

Ventilation design analysis of San Francisco Municipal Transit Authority Central Subway Light Rail Project – Chinatown Station, Moscone Station and Union Square/Market St Station (September - October 2011), San Francisco Municipal Transportation Agency (SFMTA), CA, USA.

Review of whitepaper for the Seattle I-90 road tunnel two-way transit (September 2011). Client: Washington Department of Transportation (WSDOT), WA, USA.

Other activities:

- “Smoke backlayering control and smoke extraction configurations for road tunnel fire smoke management”, Presented at the 2012 Society of Fire Safety Annual Conference, Savannah, GA, USA. October 14-19, 2012.
- Presentation on tunnel ventilation and fire life safety design concept at the Department of Mechanical Engineering, the University of Hawaii at Manoa, HI, USA, April 23, 2012.

**SGA, Stephen Grubits & Associates, Sydney, Australia      May – September 2011**  
**Fire Safety Engineer**

Consulting projects (May - September 2011):

Perth City Link (May – Sep, 2011), Perth City, Western Australia. Provided Fire Safety Engineering advice on the Railway Station and the 510m long rail tunnel linking the Joondalup Line and Fremantle line tunnels. Client: Public Transport Authority (PTA), Western Australia.

Banora Point Land Bridge Fire Assessment (June-July 2011). SMEC. Provided the fire resistance analysis report for the 75m long underpass of the Banora Point Land Bridge, NSW, Australia.

Sydney Intl Airport Terminal 1, Emirate Lounge Expansion Fire Engineering Design, Sydney, Australia (August – Sep, 2011). Client: Sydney Airport Corporation, Australia.

Other activities:

- Presentation at the Society of Fire Safety seminar, Sydney division, Engineers Australia: Tunnel ventilation and fire life safety design concept, August 17, 2011.
- Presentation for the University of Western Sydney, Department of mechanical Engineering: Tunnel ventilation and fire life safety design concept, June 6, 2011. Presented at the UWS, NSW, Australia.

**PB, Parsons Brinckerhoff, Australia  
Tunnel Ventilation Engineer**

**November 2007 - May 2011**

During 2007-2011, Yunlong was employed by Parsons Brinckerhoff in Sydney as a Tunnel Ventilation Engineer. Activities and deliverables include:

Design and consulting projects (Nov 2007 – May 2011):

Waterview Connection Tunnels (2010), Auckland, New Zealand. New Zealand Transport Agency (NZTA). Provided pre-tender advice on the spacing of the cross passages for the 3-lane 2.5km long twin-tube tunnels, Auckland, New Zealand.

Victoria Park Tunnel (2010), Auckland, New Zealand, New Zealand Transport Agency (NZTA). CFD modeller. Provided modelling service for electrical room and sump ventilation design, Auckland, New Zealand.

Sydney Western Metro (2009–2010), Sydney, NSW, Australia, Transport Infrastructure Development Corporation. CFD modeller. Provided modelling service for smoke management design and natural ventilation for the Sydney Olympic Park Station, NSW, Australia.

Airport Link, Northern Busway (Windsor to Kedron) and Airport Roundabout Upgrade (2008–2010), Thiess – John Holland Group Joint Venture (project value: \$4.8b). CFD modeller. PB in partnership with Arup has delivered detailed design for project that will connect Bowen Hills to northern suburbs and Brisbane Airport. Involved in all phases from tender to delivery for Airport link tunnel and Northern Busway tunnels, Brisbane, Qld, Australia.

New Lynn Rail Box Ventilation Options Study CFD Modelling (2007–2008), Auckland, New Zealand. CFD modeller. Responsible for performance-based fire and ventilation engineering assessment. Natural ventilation system was designed for diesel train railway station with centrally located platform. Mechanical ventilation is avoided by providing optimised cantilever width leaving sufficient opening area to street level. Client: Beca, Auckland, New Zealand.

Review of Fire Engineering Report for Top Ryde Shopping Centre Redevelopment (2007), Ryde, NSW, Australia. Fire engineer. Provided fire safety design assessment of basement car parks enclosed driveways. Client: Bovis Lend Lease, NSW, Australia.

Management (Nov 2007 – May 2011):

- Developed a design manual for tunnel ventilation and fire life safety design;
- Developed a relevant business procedure for tunnel systems team;
- Developed a CFD quality control procedure;
- Developed a frame work on how to utilize CFD capabilities within the company.

Business development (Nov 2007 – May 2011):

- Development of capability statement of tunnel systems team;
- Developed project sheets;
- Business development presentation;
- Researched pressure loss modelling methodology in road tunnel;

- Researched the smoke exhaust options for railway station with Platform Screen Door (PSD).

**Exova WFRA, Warrington Fire Research Australia      Nov 24, 2006 - Nov 23, 2007**  
**Fire Engineering Consultant**

Responsibilities:

- Fee Proposal
- Fire Engineering Brief (FEB)
- Fire Engineering Report (FER)
- Fire and ventilation assessment using CFD and CFAST model
- Occupant Evacuation modeling (SIMULEX)
- Fire Brigade Intervention modeling (FBIM)
- Interaction with Fire Brigade, Certifier, Client and Architect

Selected Consulting jobs delivered (Nov 2006 – Nov 2007):

Dec 2006: Fire Safety Assessment of Royal Melbourne Hospital Brick Rectification, VIC, Australia;

Jan 2007: Ventilation Assessment of Melbourne Airport Duty Free/Retail Area, VIC, Australia;

Jan-Feb 2007: Fire Safety Assessment for the industrial development at Percey Street, Auburn, NSW, Australia;

Jan-Feb 2007: CFD assessment of Austate Warehouse, NSW, Australia;

Feb 2007: CFD assessment of fire safety for the development at Darling Island Road, NSW, Australia;

Jan-Feb 2007: CFD modeling of smoke leakage through door gap (WFRA test), VIC, Australia;

Feb 2007: Semi-underground Car par ventilation assessment for the industrial development at Lot 24 Prince Henry, Little Bay, NSW, Australia;

Mar 2007: CFD assessment of smoke duct flow for Queensland Prison cells, Australia;

Mar-Apr 2007: Industrial development of 2-6 Burrows Road, St Peters, NSW, Australia;

Mar-May 2007: Fire Safety assessment for the Warehouse at 12 Barcoo St, Roseville, NSW, Australia;

Apr-Sep 2007: Ventilation and Fire Engineering assessment for Reliance Rail Maintenance Facility, NSW, Australia;

Apr-May 2007: Ventilation Assessment for Fairfield Woolworth Retail Area, NSW, Australia;

Apr-August 2007: Fire engineering report for Fairview Aged Care Facility, Moree, Australia;

Apr-May 2007: Fire engineering for TOYOTA POPE, Caringbah, NSW, Australia;

May-June 2007: Evacuation assessment for Stockland Shopping Centre, Merrylands, NSW, Australia;

May-June 2007: Fire safety assessment for Woolworth, Erskine Park, NSW, Australia;

May-June, 2007: Fire safety assessment for Anzac Ave, Smeaton Grange Var., NSW, Australia;

June 2007: Fire safety assessment for Bunnings Warehouse, Mittagong, NSW, Australia;

July-Sep 2007: Smoke ventilation assessment for Aldi, Preston, NSW, Australia;

July 2007: Fire safety assessment for the industrial development at 22 Clearview Place, Brookvale, NSW, Australia;

July-Sep 2007: Fire safety assessment for Bunning Warehouse, Hoxton Park, NSW, Australia;

Aug-Sep 2007 Fire safety assessment for 13 Cooper St, Smithfield, NSW, Australia;

Sep 2007 Fire safety assessment for Bunnings Warehouse, Dubbo, NSW, Australia.

**CSIRO, Sydney, Australia**

**Nov 24, 2003 – Nov 23, 2006**

**(Commonwealth Scientific and Industrial Research Organisation),  
Research Scientist**

During 2003-2006, Yunlong was employed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Sydney Australia as a fire modelling Research Scientist, in the division of CSIRO Manufacturing and Infrastructure Technology. His research interests are in the field of computer modelling of fluid flow, heat transfer and turbulence applications.

His duties on commencement include:

- Mathematical modelling of thermal and fluid processes
- Mathematical simulation of various fire growth and heat and smoke dispersion scenarios;
- Theoretical, numerical and experimental investigations of material flammability fire suppression and simulation of fires in buildings and facilities
- Develop CFD model improvements
- and/or subsequently such duties as the Chief Executive, or a person delegated by the Chief Executive, may allocate from time to time

Research Projects:

BRANZ design fire for apartment buildings (cooperate with BRANZ, and University of Canterbury, NZ)

CSIRO Flagship project on solar energy utilization (cooperate with division of energy technology)

Investigation of the water mist fire control of a train carriage

Validation of PHOENICS against ISO room corner fire

Quantitative fire and life safety analysis for Sydney Harbour Tunnel, 2004, NSW Australia.

Heat release Rate calculation of a train fire experiment in Queensland, Australia.

Consulting projects (1 July 2005 – 31 Jan 2006):

Fire engineering CFD modelling of SCANIA Ware house, January 2006, NSW, Australia.

Fire Engineering CFD modelling of Macau Casino, January 2006, PR China.

Fire engineering assessment and risk analysis of St Mary Ware house, July 2005, NSW, Australia.

Fire Engineering Assessment of Macquarie Goodman Skylights in NSW, July 2005, NSW, Australia.

Computational fluid dynamics modelling of fire growth and smoke movement for Westfield shopping centre in Parramatta, August 2005, NSW, Australia.

Computational fluid dynamics modelling of fire growth and smoke movement for 3km long Shenzhen Metro Tunnel Line No.4 – Phase II Project, China (September-October 2005).  
Client: Meinhardt, Hong Kong, PR China

Computational fluid dynamics modelling of fire radiation from the non-compliance balcony, Oberon (UNSW project), October 2005, NSW, Australia.

Computational fluid dynamics modelling of smoke management of a shopping complex mall, October 2005, NSW, Australia.

Computational fluid dynamics modelling of fire growth and smoke movement for Kotara Westfield Shopping Centre in New Castle, November 2005, NSW, Australia.

Computational fluid dynamics modelling of fire and smoke transport for Botany Bay warehouse, November 2005, NSW, Australia.

Computational fluid dynamics modelling of Balconies to 54/56 Milson Road, November 2005, NSW, Australia.

Computational fluid dynamics modelling of Penrith Westfield shopping centre, December 2005, NSW, Australia.

Computational fluid dynamics modelling of Warrawong Westfield shopping centre, Wollongong, December 2005, NSW, Australia.

Computational fluid dynamics modelling of Silverwater Ware House, December 2005, NSW, Australia.

Fire testing:

- AS1530.3 standard tests
- IMO A653(16) tests
- ISO 9239-1 standard tests
- AS/NZS 3837
- DR AS 6598

**ETH, Swiss Federal Institute of Technology, Zurich, Switzerland    Dec 2000 – Nov 2003  
Research Scientist**

Yunlong was employed by the Swiss federal Institute of Technology as a research scientist in the Department of Architecture. His research interests were in the field of industrial applications of Computational Fluid Dynamics.

Major activities include:

Mathematical modelling of fire spread in a building, validation study sponsored by ETH Zurich, Switzerland.

Numerical study of airborne particle transport in an operating room, Zurich University Hospital, Switzerland.

Optimization of SARS defender in a hospital ward by Computational Fluid Dynamics, Switzerland.

Consulting services for the airflow in operation theatre, Zurich University Hospital, Switzerland.

**TUD, Delft University of Technology, The Netherlands, December 1999 – May 2001  
Senior Research Fellow**

Yunlong was employed by the Delft University of Technology as a Senior Research fellow in the Faculty of Applied Physics. His research activities are in the field of turbulence modelling. His duty was to investigate the VLES turbulence modelling theory with benchmark cases, and to investigate the flow over the Ahmed body, which involves the flow separation, reattachment, and vortex shedding flows.

**UHM, University of Hawaii, Honolulu, Hawaii, USA,    June 1999 – December 1999  
Postdoctoral Research Fellow**

He was employed by the University of Hawaii as postdoctoral researcher in the Department of Mechanical Engineering. His research activities were involved in the field of turbulence modelling of two-phase flow funded by the NSFC, USA.

**University of Petroleum at East China, Shandong Province, P.R. China**  
**Associate Professor** October 1998 – December 2001  
**Lecturer** April 1993 – September 1994, December 1997 – October 1998  
**Teaching Assistant** April 1990 – April 1993

Yunlong was employed by the University of Petroleum as a Teaching Assistant, Lecturer and an Associate Professor at the Department of Civil Engineering. His research interests were numerical study of fluid flow related engineering problems.

Major activities:

- Responsible for natural science project in hydro-cyclone
- Guide the MSc, BSc students with their degree thesis
- Give lectures to BSc students
- Guide the field practices for BSc students

**Tsinghua University, Beijing, China** September 1994 – December 1997  
**Research Associate & PhD Candidate**

Yunlong was a research associate at Tsinghua University while working on Ph.D. dissertation. As the key contributor, he worked on the following research projects:

- Active Thermal Control of Manned Space Station, Funding: China National Defence Science and Technology Committee (PR China National High Technology 863 Project).
- Similitude Study of Flow and Heat Transfer in a Spacecraft Cabin, Funding: PR China National Natural Science Foundation (No.596866003).
- Visualization Study of flow in the Cabin of 10-ton Space Station Lab, Funding: PR China National Space Science Corporation.

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## MODELLING PACKAGES

- ANSYS-CFX v5.5, ANSYS-FLUENT v15, v19.2.0
- Fire Dynamics Simulator (FDS v5, v6), Pyrosim
- Subway Environmental Simulation (SES v4.1), v5.0, SVS v6.0
- PHOENIX, X-stream, SIMPLE3D
- CAMEL, IES-SIMULEX
- ICEM-CFD, GAMBIT, ENSIGHT7, TECPLOT, FIELDVIEW, MATLAB

## OTHER COMPUTER APPLICATIONS

- MS Office Word, Excel, Powerpoint, etc.
- Windows, Linux, Unix, iOS system

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## SELECTED JOURNAL PUBLICATIONS:

Liu Y, Cassady S., 'A Modified Critical Velocity for Road Tunnel Fire Smoke Management with Dedicated Smoke Extraction Configuration', *Case Studies in Fire safety*, Volume 1, Number 2, page 16-27, 2014.

Liu, Y, Munro, J & Dandie, B 2010, 'Fire and smoke management in a uni-directional road tunnel for a congested traffic condition', *International Journal of Ventilation*, Volume 8, Number 4, pp 385–396.

Liu, Y, Munro, J 2009, Air Quality Analysis for Natural Ventilation in an Open Trench Railway Station, *PB Network*, Issue No.70, page 23-25.

Liu, Y, Apte, V, Luong, Y, Liu, X & Yung, D 2007, 'A methodology for assessment of visibility in road tunnel fires', *Journal of Fire Protection Engineering*, Volume 17, Number1, pp. 65–79.

Liu, Y, Liu, X & Paroz, B 2006, 'CFD assessment of fire scenarios in a railway tunnel', *International Journal of Ventilation*, vol. 5, no. 2, pp. 205–218.

Liu, Y, Moser, A & Sinai, Y 2004, 'Comparison of a CFD fire model against a ventilated fire experiment in an enclosure', *International Journal of Ventilation*, vol. 3, no. 2, pp. 169–182.

Liu, Y & Moser, A 2003, 'Numerical study of hybrid ventilation of apartments in a densely populated urban neighborhood', *International Journal of Ventilation*, vol. 1, no. 3, pp. 219–224.

Liu, Y, Moser, A. & Harimoto, K 2003, 'Numerical study of airborne particle transport in an operating room', *International Journal of Ventilation*, vol. 2, no. 2, pp. 103–110.

#### REFEREED CONFERENCE PUBLICATIONS:

Yunlong Liu, Sean Cassady, Eric Jones, Petr Pospisil, Review of Design Fire Heat Release Rate for Tunnels with Fire Suppression Systems, ISTSS 2023, Stavanger, Norway.

Yunlong Liu, Sean Cassady, Eric Jones, Petr Pospisil, Design fire heat release rate of flammable liquid fires under water mist suppression in a tunnel, ISTSS 2023, Stavanger, Norway.

Sean Cassady, Harris Raharja, Eric Jones, Yunlong Liu, Wind impact on fire emergency ventilation for a road tunnel with water-based fire protection systems, paper #89, 19th International Symposium on Aerodynamics, Ventilation and Fire in Tunnels. Brighton, UK; 28 – 30<sup>th</sup>, September 2022.

Sean Cassady, Harris Raharja, Eric Jones, Yunlong Liu, A streamlined approach for tunnel structural fire durability design, paper #91, 19th International Symposium on Aerodynamics, Ventilation and Fire in Tunnels. Brighton, UK; 28 – 30<sup>th</sup>, September 2022.

Yunlong Liu, Sean Cassady, Sizing of extraction ventilation system and air leakage calculations for SR99 tunnel fire scenarios, 16th International Symposium on Aerodynamics, Ventilation and Fire in Tunnels Seattle, USA; 15 - 17 September 2015.

Yunlong Liu, Sean Cassady, Optimization of Mechanical Ventilation Operations for State Route 99 Tunnel, 16th International Symposium on Aerodynamics, Ventilation and Fire in Tunnels Seattle, USA; 15 - 17 September 2015.

Liu, Y., Cassady, S., et al, 2014, "Smoke Management in Subway Stations Due to Train Arson Fire Scenario", paper presented at ISTSS 2014 in Marseille, France, 12-14th March, 2014.

Liu Y, Cassady S., 2013, 'A Modified Critical Velocity for Road Tunnel Fire Smoke Management with Dedicated Smoke Extraction Configuration', Proceedings of BHR ISAVFT15 Page 231-246, Spain, 18 - 20 September 2013.

Liu, Y, Munro, J & Vasilovska, M 2009, 'Optimization of the trench opening area for a naturally ventilated railway station with diesel trains', *paper presented at BHRG Conference*, New Brunswick, NJ, USA.

Wakefield, T, He, Y, Liu Y & Dowling, V. 2007, 'Performance of solid timber external walls under simulated bushfire attack', *Proceedings of the 7th Asia Oceania symposium on fire science and technology*, Hong Kong, China, 22–24 September.

England, P, Chow, V & Liu, Y 2007, 'Modeling smoke spread through barrier systems', *paper presented to Australian Institute of Building Surveyors Conference*, Adelaide, 4–7 March.

Chen, D, Liu, Y, Benito, R & Stein, W 2006, 'CFD modeling of the radiation and convection losses through the MTSA receiver aperture', *paper presented to the 5th International Conference on CFD in the Process Industries*, Melbourne, Australia, Melbourne, 13–15 December.

Liu, Y, Apte V, Luong Y, Liu, X & Yung, D 2005, 'Tunnel fire and life safety issues', *paper presented to the 8th International Association for Fire Safety Science (IAFSS) Symposium*, Beijing, 18–25 September.

- Liu, Y, Liu, X & Paroz, B 2005, 'CFD assessment of fire scenarios in a railway tunnel', *paper presented to Road Rail Sea Fire Safety Conference*, Melbourne, 2–4 November.
- Liu, Y, Apte, V, White, N & Yung, D 2005, 'A parametric study of a water mist system for fire suppression in a train compartment', presented to Road Rail Sea Fire Safety Conference, Melbourne, 2–4 November.
- Liu, Y & Apte, V 2004, 'Evaluation of PHOENICS fire model against room corner fire test', *Proceedings of international PHOENICS user conference*, Melbourne, 2–5 May, 2004.
- R.P. Khatri, V. Apte, V. Sirivivatnanon, Y. Liu and A. Bhargava, Tunnel fire modeling & concrete lining protection, *The 6th Annual Tunnelling 2004, The Westin Sydney*, 30th & 31st August 2004.
- Liu, Y & Moser, A 2003, 'Numerical study of forced ventilated fire in enclosure', *Proceedings of 4th international symposium on heating, ventilation and air conditioning*, Beijing, China.
- Liu, Y & Moser, A 2003, 'Numerical modeling of airflow over the Ahmed body', *Proceedings of CFD2003*, Vancouver, Canada, vol. 2, pp. 480–485.
- Liu, Y & Moser, A 2003, 'Influence of time step length and subiteration number on the convergence behaviour and numerical accuracy for transient CFD', *Proceedings of CFD2003*, Vancouver, vol. 2, pp. 507–512.
- Liu, Y & Moser, A 2002, 'Airborne particle concentration control for an operating room', *Proceedings of 8th International Conference on Air Distribution in Rooms*, Copenhagen, pp. 229–232.
- Moser, A & Liu, Y 2001, 'Fan-in-wall for hybrid ventilation in hot climate', *Proceedings of the 4th international conference on IAQ, ventilation and energy conservation in buildings*, Chang Sha, China, October.
- Liu, Y, Ren, J & Qu, W 1998, 'Ground thermal scale modeling of ventilation in a space station cabin', *Proceedings of the 2nd international symposium on scale modeling*, K Saito (ed.)
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