

Andrew Staszak
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Mr. Staszak has been immersed in a multitude of projects throughout the energy sector for more than seventeen years. His duties working as an engineering consultant include project execution, management, and technical development. This experience has been mainly focused in the risk and technical safety market for design and development of new facilities and supporting continuing operations of active facilities.

He has led and managed the execution of numerous assessments; risk, performance and optimization, and quantitative based; on projects throughout the world. Mr. Staszak previously served as the manager of MMI Engineering US, leading business development and client management efforts and as the Computational Fluid Dynamics (CFD) technical service manager for Atkins, helping to build and continue to develop the practice, particularly in the areas of coupled CFD/Optimization simulation methods for use in Oil & Gas. He has conducted and led assessments for all types of hazard cases throughout the energy sector using numerous commercial codes and has developed in-house CFD codes to use in these applications as well.

Mr. Staszak has performed dispersion, toxic, dust, explosion, and fire hazard analysis using both phenomenological and computational fluid dynamics techniques on a multitude of projects. He has worked on projects including LNG liquid and gaseous dispersion to analysis of risks and hazards related to green energy projects.

Expertise

- Hazard Identification, SIMOPS, HAZID, Qualitative Risk Assessment, Conceptual Risk Assessment, Facility Siting
- Risk Criteria/ Risk Management Plan Development and Guidance
- Project HSE Support (design and operations)
- Risk and Consequence Modeling & Analysis
- Computational Fluid Dynamics Modeling - CFD - (Combustion, Dispersion, Toxic, Fire, Explosion,
- Testing, Design, Optimization and performance verification, and Design Simulation

Academic Background

In progress: PhD in Aerospace Engineering (Candidate, expected graduation 2024), Mississippi State University, Starkville, MS, USA
Master of Science (2006), Mechanical Engineering, University of Texas at San Antonio, San Antonio, TX, USA
Bachelor of Science (2004), Aerospace Engineering, Texas A&M University, College Station, TX, USA

Engineering and Analysis Experience

Recent Project Experience

A number of recent relevant projects Mr. Staszak has been involved in are summarized below:

- Corporate Facility Siting and Quantitative Risk Analysis Training
- Various Facility Siting Study and Risk Analyses for numerous clients (Tronox, Buckeye, Plains, IMTT, Targa, Cheniere, Baker Hughes, etc.)
- Multi-component modeling approach development and modeling to support design of nuclear waste storage system components.
- CFD modeling to support reconstruction of industrial incident involving dispersion and explosion.
- CFD explosion modeling for layout and building design verification for weapons manufacturing facility (blast walls and blast resistant buildings).
- SDG&E Redox Battery Plant, Hazards Assessment for dispersion, toxic, and fire
- SDG&E Hydrogen GenCell Hazards Assessment for hydrogen dispersion, fire, and explosion (CFD)
- Kiewit Fields Point and Commercial Point LNG fire analysis and PFP Optimization
- Chevron Rosebank, CFD Exhaust and Vent modeling for Helicopter and Operations review

- Suncor Forthills, CFD Dispersion and Explosion modeling (transient 2-phase and fluid structure interaction)

Detailed Experience

Safety and Risk:

Mr. Staszak has conducted and led numerous projects related to safety and risk throughout the energy industry. This includes:

- Developed and lead Facility Siting and Quantitative Risk Assessment Training Programs
- Authoring a Risk Management Program Guidance Document for the completion of safety case work concerning classification of offshore vessels and facilities for a major class society
- Facilitated HAZID workshops for qualitative/quantitative risk assessments and facility siting analysis.
- Lead efforts to conduct several performance based passive fire protection assessments to optimize protection schemes and reduce maintenance requirements.
- Managed numerous safety studies as part of the design process and operational verification of numerous fixed and floating offshore facilities. (EERA, ESSA, DORA, QRA, FERA, FEA)
- Developed methodology and conducted risk and consequence based facility siting analysis for a variety of petro-chem facilities (100+).
- Managed/Authoring first of a kind Major Accident Risk Assessment Guidance Document (MAR) for land based wind power generation facilities to be used throughout the United States for a major energy corporation.

Accident Investigation and Forensics:

Mr. Staszak has been involved in supporting accident and forensic investigation across various industries. This includes:

- Abengoa North America, Arizona Solar One, AZ: Site and process investigation related to toxic vapor and permit controlled vapor collection and mitigation. Conducted root cause assessment to identify process failures and develop performance standards for verification.
- Clark County Jail, WA: Developed a risk based assessment of the site and surrounding areas to support litigation and written testimony for state filings.
- Murphy, TX: Investigated tank battery fire and explosion event resulting from failed start-up operations. Lead operator interviews, site investigation, and supported root cause.
- West Fertilizer, TX: Provided initial technical support for response to the fertilizer plant explosion. Assisted site investigations in preliminary time reconstruction, conducted chemical kinetics and combustion calculations, and developed yield maps for site damage predictions.
- Kayaku, Mexico: Conducted post incident cause and origins investigation, conducted chemical kinetics analysis and ignition source determination, as well as yield calculations.
- Coryell Hospital, TX: Provided technical modeling support utilizing CFD (dispersion, ventilation, explosion) to support cause and origin investigation.
- Client Confidential, LA: Provided process safety and operations support in post rupture accident evaluation of buried pipeline.

Security and Risk:

- Chemical Facility Anti-Terrorism Standards (CFATS) – Participated in a review of nitrate based chemicals on restricted chemicals lists and developed a ranking program to evaluate their effectiveness and desirability as an IED component.
- Facilitated a Security Vulnerability Assessment Workshop for an on-shore LNG Storage Facility.
- Worked to develop a first of a kind security identification study (SECID), which integrates a risk based review to identify both total facility and individual equipment vulnerabilities.
- Worked with Sandia National Labs to perform modeling of dynamic LNG releases from intentional (threat based) scenarios on water.

- Provided guidance to clients on risk based assessments for protective standoff and design of buildings.

Liquefied Natural Gas and Cryogenic:

- Lead efforts to conduct a review of all processes at the Dominion Cove Point LNG Plant to develop a smart, searchable, and field serviceable chemical database of all permit covered materials in the facility. The database was developed for use in support of on-going Leak Detection and Repair (LDAR) analysis and performance verification work.
- Conducted a detailed process review of waste heat recovery units at the Cheniere Energy Sabine Pass LNG Facility to develop a fire risk assessment of operations in support of engineering and operational mitigation efforts. Constructed a cost benefit and risk reduction analysis to be used in mitigation selection and verification of mitigation quality.
- Lead and conducted cryogenic and fire protection assessments for several liquefaction and storage facilities.
- Performed Quantitative Risk Analysis on a number of LNG facilities.
- Performed extensive CFD modeling of LNG and cryogenic material spills, pool fires, jet fires, and gas dispersions on land and water from process leaks.
- Performed IRAs on Calypso (FL) and Cabrillo (CA) Deep Water Port (DWP) applications to US Coast Guard. Including, developing a first-of-its-kind CFD analysis for LNG consequence assessment with the US Coast Guard and Sandia National Labs
- Conducted Independent Risk Assessment of Deep Water LNG Ports. Reviewed essential equipment survivability for an FPSO to determine if drilling operations could be shut-down in the event of a blackout situation (simultaneous operations evaluation).
- Lead efforts to develop optimized passive fire protection schemes for small scale LNG facilities throughout the US based on detailed fire and structural modeling.

Consequence Assessments and Modeling:

Mr. Staszak has extensive experience in conducting modeling and assessments to quantify the consequences of energetic events using simple phenomenological models, complex computational models, developed in-house codes and models, and integration of test data. Some examples include:

- Performed blast load calculations including high explosives, internal and external vapor cloud explosions (VCE), bursting pressure vessel, dust explosions, and BLEVEs. Modeling has included structural analysis and response to capture effects from failing/impacted objects.
- Analyzed thermal loads on equipment and personnel, thermal radiation exposure, soot/smoke impairment from fire simulations, both on and off shore.
- Conducted facility siting studies to determine structural damage from vapor cloud explosions and other hazards.
- Conducted CFD modeling of for numerous effects and applications throughout the Oil&Gas, petro-chem, and other Industries which includes:
 - Vapor dispersion for prediction of on and offsite effects and flammable/toxic concentration prediction
 - Jet, spray, and pool fire modeling including verification of fire protection and heat up criteria
 - Pool spill and vaporization (on land and water)
 - Multiphase releases
 - Dust/particulate dispersion
 - Exhaust and plume interactions for personnel, helicopter, intake, and other operations
 - Vapor cloud explosion modeling including geometric response effects (buildings, blast walls, relief panels)
 - Design and layout optimization and verification
 - Design and verification
 - Other fluids modeling for project and design support work

- Performed blast and thermal shielding analysis to determine the placement and effectiveness of blast and thermal barriers (protection for both personnel and structures) for both offshore and onshore facilities (includes modeling of water spray systems).

Engineering Software Development:

Mr. Staszak has maintained a personal and professional interest in the development of software and tools for use in engineering applications throughout his career. During that time, he has been actively working to and leading efforts to develop simple and advanced tools which leverage technology. Some of these examples include:

- RisqCAD, expanded development into 3D mapping (fires and explosions) and updated visualization capabilities.
- HazMap Software, developed to provide clients with an interactive visual tool for viewing the results of consequence based siting assessments.
- Involved with the development of software used for release modeling, combustion/fire modeling, vapor cloud explosion, and risk calculations.
- Contributed to the development of a risk based facility siting software tool methodology.
- Worked to expand development of existing CFD software and applications through the use of optimization tools.
- Developed IFLAME, a chemical kinetics code used to calculate/predict time dependent combustion of combinations of chemical compounds, and optimized for efficiency in complex chemical compounds.

Testing and Design:

- Contributed and lead efforts related to over 100 greenfield and brownfield design projects including chemical plants, wind farms, manufacturing, offshore platforms, processing and storage vessels, etc. This work including conducting analyses to determine design limits, specifications, and modifications to improve operations, meet client or regulatory criteria, and optimize performance.
- Currently working to develop a pressure testing fragment consortium to improve the understanding of fragment generation, characteristics, and penetration understanding. Specifically, to aid in the improved design of high pressure testing barriers and test-cells.
- Supported the startup of PFPnet, an international subscription funded group, aimed at improving the analysis, specification, inspection, application, and testing of passive fire protection materials in the oil and gas industry.
- Performed design and testing to support structural damage assessment programs.
- Developed, tested, and implemented a silica based thermite initiation system for a shock tube facility.
- Developed, modeled, tested, and implemented a flow inducing/diversion device to improve loading profiles for a shock tube test system.
- Conducted simulations (CFD) of physical models used to design, validate, and tune a shock tube test facility.

Professional History

SciRisq, Houston, TX 2019 to Present

- Principal

Thornton Tomasetti, Inc., Applied Science, Houston, TX, 2018-2019

- Senior Associate, 2018-2019

MMI Engineering, (purchased by Thornton Tomasetti), Houston, TX, Senior Professional

- MMI US Manager, 2016-2018

Atkins, Houston, TX, 2013-2016

- Principal Consultant - CFD Technical Service Manager, 2015-2016
- Senior Consultant, 2013-2015

ABS Consulting, San Antonio, TX, 2011-2013

- Lead Engineer, 2011-2013

Risknology Inc., Houston, TX, 2005-2011

- Senior Consultant, 2009-2011
- Consultant, 2005-2009

University of Texas San Antonio, Texas

- Graduate Research Assistant 2005-2006
- Graduate Teaching Assistant 2005-2006

Recent Publications and Presentations

Staszak, A, Akinci, O., Kim, H., Rivard, C., Stahl, M., “Development of Resilient LNG Facilities,” 23rd Annual Process Safety International Symposium, Texas, October 2020

Staszak, A, Clutter, J., Stahl, M., “Investigating the use of Geometric Shadowing and Thermal Radiation Mapping to Improve Fire Modeling in Offshore Facilities,” Offshore Technology Conference, Texas, 2020

Staszak, A and Clutter, J., “Leveraging CFD in earlier design stage to capture critical effects and sensitivities with simple cost effective approach to explosion modeling.,” Offshore Technology Conference, Texas, 2020.

Staszak, A and Clutter, J., “Adaptive Meshing – The Future of Explosion Modeling,” 16th *Global Congress on Process Safety*, Texas, 2020

Staszak, A and Ganjam, S., “Use and Comparison of Different Passive Fire Protection Assessment Methods for LNG Plants,” 14th *Global Congress on Process Safety*, Florida, 2018

Staszak, A. and Brandy, R., “Responses to Extreme Flood Events – At the Intersection of Sea Level Rise and Industrial Facility Operations,” International Liquid Terminals Association (ILTA) 38th Annual Conference, Houston, TX, 2018

Staszak, A. and Stokes, D., “Beyond the Rainbow: Practical Improvements in the Presentation and Communication of Hazard and Risk Analysis Data,” 17th Annual AIChE Spring Meeting, San Antonio, TX, 2017

Staszak, A. and Reynolds, G., “Using CFD to Optimize the Orientation on an Offshore Platform,” World Oil Publications, January 2017