

## Blast Analysis and Design Capabilities

### Background

Westinghouse provides full-scope blast analysis and design capability to address needs for commercial and critical infrastructure clients.

Our specialized engineers have extensive experience in the evaluation of blast effects from accidental and malevolent explosions. We are world leaders in the design, analysis and blast risk assessment of critical facilities such as nuclear power plants.

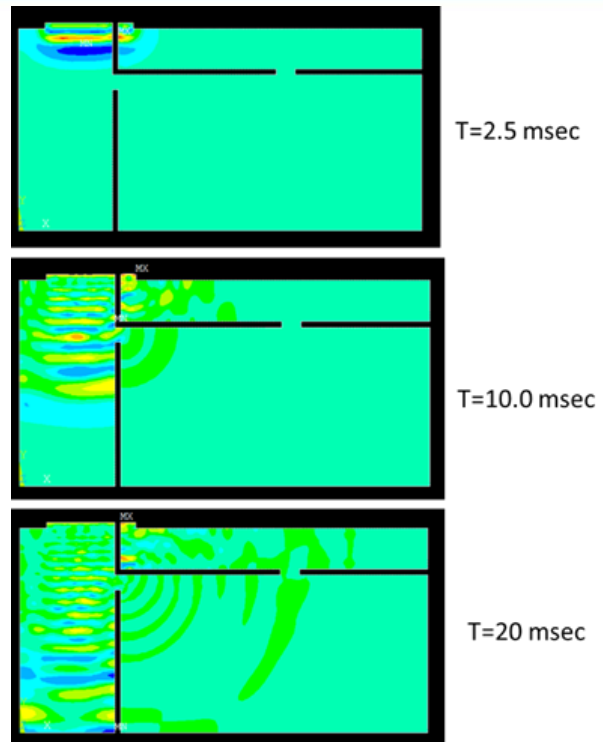
Westinghouse has a long history of providing innovative solutions for specialized customer needs to meet code, regulatory and other unique requirements.

With its vast experience in critical facility design and implementation, Westinghouse has the expertise to develop, plan and perform state-of-the-art analysis and the know-how to implement practical solutions.

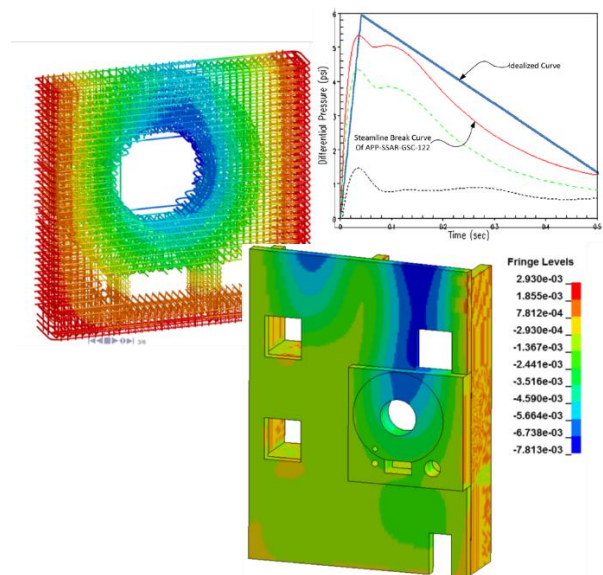
### Description

Westinghouse has extensive experience in the following areas:

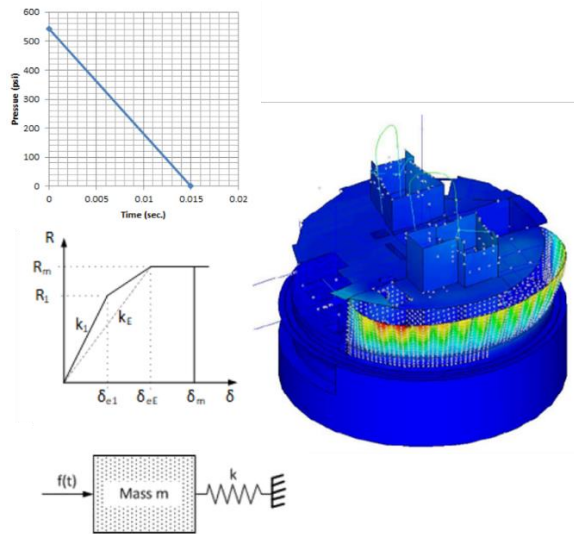
- Blast design for critical facilities such as nuclear power plants, industrial sites, and military bases
- Design of blast mitigation strategies such as barriers and enclosures
- Design and analysis of buildings to resist progressive collapse
- Dynamic and non-linear analysis (3D ANSYS®/LS-DYNA®/ABAQUS®) of concrete, steel, and composite structures subjected to blast and impulsive effects
- Blast fragmentation and effects on structures and components
- Shock and vibration effects on building components and equipment
- Peer review of blast design projects



*Complex Internal Blast Shockwave Propagation  
(Building Plan View)*



*Impulsive loading on a critical piping penetration*



*Hydrogen explosion effects on a critical structure*

## Benefits

Westinghouse has the ability to integrate its expertise in structural design, analysis and testing to develop creative solutions for the industry's toughest challenges. We provide high-quality products in conformance with industry codes and standards, satisfying strict internal QA processes as well as ISO 9001 requirements. Our background in the design and analysis of nuclear-grade structures and components, qualifies us uniquely to take on challenging blast analysis problems.

Some benefits of a high-quality Westinghouse blast evaluation include:

- Robust blast designs that are optimized for performance and economical to fabricate and construct
- Access to experts with extensive experience in civil, structural and blast-related design and analysis
- Confidence that designs will satisfy relevant code provisions
- Assurance that a high-level of quality measures have been utilized
- Confidence that final design will perform as intended under extreme blast events

## Experience

Westinghouse has a broad range of blast design and analysis experience. Recent projects include:

### *Hydrogen Explosion Evaluation (2019-2020)*

Our Westinghouse team performed an evaluation of effects of a hydrogen gas explosion. The gas explosion was postulated to occur in a safety-related storage tank. Our experts characterized the blast pressures and assessed the effect on integrity of the storage tank.

### *Containment Vessel Over-pressurization Effects (2019-2020)*

Evaluation of the effects of postulated rupture of a large containment vessel was performed by our Westinghouse team. The evaluation focused on shockwave effects on nearby building structures and occupants. Our experts used a range of simplified and more complex analysis tools to evaluate the safety of the building.

### *Large Commercial Headquarters Building (2015-2017)*

Our blast experts have experience in the blast design and analysis of critical commercial building structures. One such example is a large international project, which involved developing a design basis threat and evaluating primary and secondary building structural elements for blast effects and progressive collapse potential.

### *Critical Manufacturing Facility (2014)*

Our expertise also includes the evaluation of existing critical building structures subjected to accidental explosions. An example application is evaluating the effects of flammable gas leak at an automotive manufacturing facility. Due to the critical function of the facility, a blast analysis was performed to confirm adequate design of the explosion venting.

### *Military Testing Facility Design (2010-2012)*

Our experts have experience in blast protection design of critical military facilities. Example projects include the blast design of a military testing facility and state-of-art dynamic analysis to support blast testing of key building elements (e.g., façade/curtainwall components, anchorages, and ventilation openings).