

Structural Upgrades

EXPLOSION RESEARCH COOPERATIVE



Structural upgrade research involves finding effective ways for increasing the blast capacity of a wide range of different structures and structural components.

For more information about blast resistant structural upgrades, please contact:

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ACCOMPLISHMENTS

Design manuals and software tools have been developed for cost-effective, blast-resistant upgrades for:

- Windows
- Masonry Buildings
- Metal Buildings

The Explosion Research Cooperative worked with manufacturers to develop blast doors tailored to the specific needs of the petrochemical industry.

Practical means of reducing blast related injuries by addressing non-structural items within buildings (that might fall on occupants) have been identified.

A Joint Industry Research Program
by BakerRisk

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PREVIOUS STUDIES:

Blast Resistant Door Specifications and Testing (2002) The Cooperative sponsored an incentive for manufacturers to develop blast doors tailored to the needs of the Petrochemical Industry. Doors designed to industry specific criteria were tested in BakerRisk's shock tube and are now commercially available.

Blast Upgrades of Masonry Walls (2002) This study explored the use of external steel members to strengthen masonry walls. Testing was performed to verify upgrade capacities. Design guidelines and a computer tool for defining upgrades were developed.

Standard Building Details to Minimize Injuries and Enhance Blast Resistance (1999) This study's purpose was twofold: 1) identify non-structural items inside buildings that can injure building occupants assuming the building structure resists the applied blast load; and 2) recommend building layout information and connection details to maximize blast resistance of conventional construction. The study was performed because many explosion accidents have shown that injuries are caused by non-structural components in buildings that resist the applied blast load. Relatively minor improvements in the connections between non-structural components, such as heavy overhead items, and the structural frames of buildings can minimize these injuries.

Door Upgrade Study (1998) This study was a continuation of the conventional door blast tests from the 1997 study, where conventional doors were modified with simple structural upgrades that increased the door blast capacity. The tests performed during this project showed that the blast capacity of conventional steel doors could be significantly increased. These strengthening measures prevented the door from being blown through the doorframe opening at higher blast loads than would fail a non-upgraded door.

Metal Building Upgrades (1997) The program objectives of this study were to develop design guidelines, specific recommendations, and cost-effective methods for upgrading the blast capacity of existing conventional metal buildings and to prepare an engineering handbook demonstrating the upgrade methods.

Blast Capacity Upgrades for Masonry Buildings (1996) Design guidelines, specific recommendations and cost-effective methods for upgrading the blast capacity of existing conventional masonry buildings. An engineering handbook was prepared that demonstrated the upgrade methods.

Additional Window Upgrades (1994) The objective of this study was to optimize the design of the retrofits identified in the 1993 study and to explore alternative window upgrades. Several approaches were examined to improve the performance of plastic film.

Window Breakage and Upgrade Study (1993) This study defined a method to determine when windows require upgrades and to develop standard designs for window upgrades and retrofits. Two upgrade concepts were developed, prototyped, and tested. The study demonstrated that hazards from glass can be significantly reduced.



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For additional information on participating in the Explosion Research Cooperative, visit www.BakerRisk.com or email us at Co-op@BakerRisk.com