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B72-10613

NASA TECH BRIEF

Marshall Space Flight Center

A Four-Panel Enclosure Protects From Explosion

The problem:

Personnel involved in the production of ammunition must be protected from accidental explosion. Protection is usually provided by reinforced concrete or metal walls with one side of the structure vented to provide an outlet for the destructive forces of the explosion. These structures are costly to build and modify, and the type of production that can be conducted within them is limited.

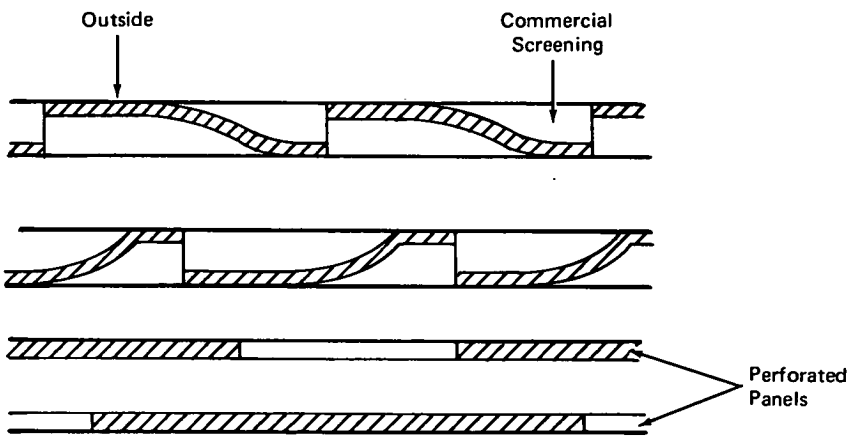
The solution:

A new type of protective enclosure has been designed which is only three inches thick.

How it's done:

In order to permit venting over the entire surface of the structure, the walls are made of several panels, each separated from the other by a distance at least equal to its thickness. Because this increased venting dissipates the explosive force, a smaller and, therefore, less expensive structure can provide the same protection as larger conventional walls. Staggered openings of dissimilar geometry (round vs. rectangular holes) reduce the amplitude of the shock wave and, at the same time, protect the operator from fragments of an exploding round. In a typical wall of four panels (see figure), the inner panel has a relatively large vented area, 75% or better, but with solid cross sections of approximately one inch (2.5 cm) to absorb the fragment energy. The next panel consists of ¼ inch (0.6 cm) mild steel with circular holes, which provide approximately 20 to 25% venting. The two outer panels are constructed of horizontal louvers made of 1/16 inch (0.16 cm) sheet metal, with the louvers placed back to back.

This multi-layered baffle will effectively block any exploding fragments. Because the expanding gases are quenched by the multiple surfaces of the baffle, the size of the fireball from the HE burster or phosphorous in the rounds is reduced. To further prevent the escape of the combustible materials and to cool the combustion products (the way a flash screen does in a standard flammable liquid safety can) a wire mesh screen may be placed on the outside of the fixture. Ordinary copper-wire window screen was found to be highly effective for this purpose.



Typical Panel Structure

(continued overleaf)

Notes:

1. Information concerning this innovation may be of interest to those working with engine test cells and pressure vessel test cells in which ammunition or explosives are being tested or used. The minimum wall thickness of three inches permits the paneling to be used in buildings.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Marshall Space Flight Center
   Code A&PS-TU
   Marshall Space Flight Center, Alabama 35812
   Reference: B72-10613

Patent status:

NASA has decided not to apply for a patent.

Source: P. V. King of
General Electric Company
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Marshall Space Flight Center
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