

Aspects regarding developing of a breaching charge

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Why developing a breaching charge?

Designing and realizing/producing of a special device for breaching in different type of walls involves a lot of work and considerable financial resources. The last ones especially because of the tests that must be done, tests which need special conditions in order to be conducted.

Why developing a new breaching charge when there are a lot of them? They are specialized for certain type of obstacles and therefore you cannot use them for breaching in different obstacles. For example, around the world buildings have different structures and you will encounter different type of walls. This concludes to the need of developing a breaching charge adapted to the types of wall you have in a certain area, to their characteristics. Optimizing breaching charges in order to protect both members of the entering team and room occupants against the unwanted effects of explosion can consist in:

- Reducing the amount of explosive within breaching system by modifying the configuration of explosive charge. I propose an asymmetric sandwich configuration, which will provide on one hand the mitigation of shockwave and on the other hand the control of the effect on the desired direction. The final effect will be the decrease of the amount of explosive used in the charge.
- Achieving of a variable effect depending of obstacle thickness due to modification of the water layer used only for the mitigation of the shock wave and debris propulsion;
- Optimizing the amount of explosive used by considering the behavior of materials under high strain rate.

Through this paper there are presented elements that facilitate the development of breaching systems which can be successfully used for different types of interventions:

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- Civil emergency interventions in order to save people trapped in buildings with blocked or covered entrance;
- Firemen interventions to get quick access to potential victims of to extinguish fire;
- Counterterrorist intervention for capturing terrorists and/or hostage rescuing.

Defining the needs

It's obvious that the needs are defined by the user, but they must be realistic. This is the only way to develop an achievable breaching system.

It must be successively specified: the type or types of obstacles where the breaches must be done, the breach dimensions, and the mandatory conditions regarding the surrounding effects on each part of the obstacle. These conditions are influenced by the mode and conditions of charge placing, and by the domain within the breaching system is used (civil emergencies, firefighting, etc.).

Doing this way limitations can be imposed in connection with the human presence nearby during the functioning of the breaching system.

System design and realization

By taking into account that the explosion phenomenon is not very precise caught in the theoretical apparatus, the designer must alternate theoretical and practical approach.

Before to enter the details, is necessary to clarify if the imposed conditions are or not directing the designer to the impossibility of achieving such breaching system.

After that, from the calculus results, different options of achieving the breaching charge can be chosen, and their effectiveness will be tested on targets that simulate the imposed obstacle. So, the optimum configuration for the breaching charge will result.

Only now you can make the next step, designing the breaching system that will be placed on the obstacle. Here the resulted mass for the explosive charge has major influence on transporting and placing the system on the obstacle.

Testing and measuring



From the very first tests must be clarified if the imposed type of obstacle can be approached in the given conditions. This will save both human and financial resources.

Tests performing in this case is not easy because the testing range is difficult to find, and many times, is not nearby. For example, in the case of brick walls breaching, only the tests conducted on healthy buildings will be eloquent.

Another important aspect is constituted by the measuring equipment used during tests conducting. And, of course, the place and the mode of placing the sensors/transmitters.

The effects on related environment

The principal effects are generated by the explosion products, shockwave and projected debris.

But the designer must take into account the effects on the buildings structure, too. Although seems unimportant, the dust dispersed by explosions has bad effects on breathing system and therefore on the health of the personnel in the testing area.

Another important idea is to use in the manufacturing of the breaching system only materials that are not polluting the environment.



Conclusion

Combining the practical tests with the numerical simulations you can get very good configurations for the breaching systems.

Following the steps presented in this paper, is possible to develop special explosive devices that can be used in different domains.

In order to save financial resources, you can run first small tests in order to get the data for proper modelling the explosive effects on that particular obstacle.

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