TECHNOLOGY INSERTION TO DEVELOP MORTAR SYSTEMS FOR THE MODERN BATTLEFIELD

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Abstract. Mortar weapons have traditionally provided the infantry commander with indirect fire that is immediately available. While the introduction of mechanised forces during the 1960s and 1970s provided the impetus to mount traditional ground-based mortars into armoured personnel carriers, the weapons systems have undergone little further development. Organisational studies to support the recent drive to restructure armies into lighter, more mobile and deployable forces are showing a considerable increase in the quantity of mortars, especially heavy mortar weapon systems, that are being considered for inclusion in light armoured and mechanised infantry units. This paper discusses some of the technical methods that might be employed by designers to provide mortar weapons and ammunition with increased capabilities to meet the firepower needs of these new lighter, but more capable, forces. The paper also discusses other aspects, which will arguably provide a greater improvement, such as the provision of position and pointing information for mortar weapons, accurate target survey information and the integration of mortar weapons into vehicles that have common mobility with the remainder of the force.

INTRODUCTION

Mortar weapon systems have traditionally provided the indirect fire support for infantry units. The use of heavy mortars within light armoured and reconnaissance units is likely to increase as armies are re-structured to meet the needs of the changed world order, with an emphasis on strategic mobility without loss in the deliverable fire power available to units designed for general warfare. The cancellation of the Crusader programme in the USA in May 2002 clearly demonstrated that most 155-mm artillery systems either in current use or development are probably too heavy or too cumbersome to support rapid force projection operations. Organised armies are not the only users of mortar weapons. Their continued utility, even in the hands of relatively unskilled users without the command and control systems available to western armies, was graphically demonstrated in Afghanistan in March 2002 when elements of the US 10th Mountain and 101st Airborne Divisions were pinned down for hours by mortar fire on their helicopter landing zone.

The re-structured armed forces must be able to apply the necessary level of force in the correct timeframe to be able to influence the outcome. To be credible, these forces require integral fire support, both direct and indirect. Most current artillery systems are either self-propelled (and therefore too heavy to be strategically mobile), or towed (and therefore require multiple vehicles to deploy a single firing platform). A highly mobile and lethal indirect-fire system is essential to provide the force commander with dedicated offensive support to the early entry forces, but yet which has the capability to provide continued support for the sustainment and heavy forces. To provide this utility, however, there needs to be a better understanding and dialogue between both suppliers (what might be achievable in the way of weapon systems development) and the user (what tasks the mortar might be required to complete). In these discussions, the operational, logistical, and legal (human factors and safety) issues also need to be addressed.

Most in-service smoothbore mortar weapon systems are based on designs that are more than 40 years old. Since then, there has been only limited insertion of technology building blocks that have delivered a very slow evolution of the current systems, rather than faster revolutionary improvements. The requirements described above and the capability gaps that users are now attempting to close, in order to deliver the level of deployed firepower, have provided the impetus for industry to develop a number of enhancements to mortar systems. In addition to firepower improvements however, mortar weapon systems require improvements in mobility and protection / survivability to deliver the required capability.

FIREPOWER IMPROVEMENTS

There are a number of factors, or characteristics, that contribute to improving the firepower of mortar weapon systems, including:

- improved fragmentation for HE bomb body material;
- improved fuzing—use of lower cost and more effective air burst fuzes;
- improved consistency;
- improved accuracy;
- improved range through the use of increased muzzle velocity;
- introduction of new and improved natures of ammunition; and
- introduction of improved C4I systems into mortar units.

A number of the improvements outlined above either have been or are being developed in parallel with or subsequent to similar programmes in the artillery systems area. However the single most important factor in developing the firepower of mortar systems is in the area of electronics, which will provide information on weapon and target survey and also accurately transmit the ‘call-for- fire’ data.

Improved Fragmentation

The material used in the manufacture of high explosive (HE) mortar bomb bodies remains the subject of some debate. In many cases the material characteristics have not been

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