

# A REVIEW ON IMPROVISED EXPLOSIVE DEVICES

## ABSTRACT

Improvised explosive devices (IEDs) are among the world's oldest types of weapons. IED attacks deliberately target concentrations of civilians to achieve a maximum effect of lethality, terror and societal disruption. They may be classified as Roadside explosives and blast mines, Explosive Formed Pojectile (EFP) devices and Suicide bombings. Each of these groups cause injury through a number of different mechanisms and can result in vastly different injury profiles. The spread of communications technology has greatly abetted IED knowledge-sharing. Online groups share instructional videos or materials, both on IED construction and on execution of attacks. Terrorist groups have sometimes made enduring gains in territorial control, creating areas where sophisticated IED production facilities can go undetected for long periods of time. IED attacks deliberately target civilian objects, including airports, markets, police stations, schools, public transit, commercial hubs, nightclubs, courts, political gatherings and sports venues, to ensure infliction of the greatest amount of civilian harm.

## INTRODUCTION

Explosives are chemical compounds or mixtures which by application of an external stimulus such as heat, shock, friction or ignition undergo a rapid chemical decomposition. The chemical reaction results in sudden release of large amount of energy due to liberation of gas and temperature. The pressure thus generated is thrust out equally in all directions. All explosive compounds are composed of three components namely fuel, oxidizer and sensitizer. Carbon, hydrogen, sulphur etc provide the essential fuel for chemical reaction. Explosives have been classified in many ways according to different criteria.

An explosive device is device that relies on the exothermic reaction of an explosive material to provide an extremely sudden and violent release of energy. Types of explosive devices include:

**Bombs:** A bomb is one of a range of explosive weapons that rely on only the exothermic reaction of an explosive material to provide an extremely sudden and violent release of energy.

**Grenades:** They are weapons that are designed to disperse lethal fragments upon detonation. The body is generally made of a hard synthetic material or steel, which will provide some fragmentation as shards and splinters, though in modern grenades a pre-formed fragmentation matrix is often used

**Dynamite:** The most common composition of dynamite consists of three parts nitroglycerin, one part diatomaceous earth and a small mixture of sodium carbonate.

**Improvised explosive devices:** An improvised explosive device (IED) is a bomb constructed and deployed in ways other than in conventional military action. It may be constructed of conventional military explosives, such as an artillery round, attached to a detonating mechanism. IEDs are commonly used as roadside bombs.

## **IMPROVISED EXPLOSIVE DEVICES (IEDs)**

Attacks with Improvised Explosive Devices (IEDs) kill thousands every year, causing physical injuries, damage critical infrastructure, and spread fear and disruption across affected communities. IED production takes place outside government controls.

Improvised explosive device (IED), constructed from military or non-military components that is frequently employed by insurgents as a weapon against a conventional military force. When used as roadside bombs, IEDs can interdict lines of communication, disrupt traffic, and damage or destroy targeted vehicles

The typical injury pattern of IED victims includes amputation of both legs and arms, hands, extensive soft tissue injuries with deep penetration, pelvic fracture and genital mutilation.

## **LOCATIONS**

The most civilians killed and injured from IEDs were from incidents that took place in commercial premises.

Places of worship also saw a significant number of civilian casualties from IEDs and were a location in which such attacks were particularly harmful. Most locations saw the majority of attacks in Iraq, places of worship stand out as it is Syria that has seen the most civilian casualties from IED incidents in this type of location.

## **COMPONENTS OF IED**

1. A switch (activator)-A trigger, switch or some other direct or indirect means of setting the device off, such as a radio signal, trip wire, timer or firing button that someone presses. A common form of remote trigger is a cell phone, cordless phone, radio or garage door opener activated by someone who is watching.
2. An initiator (fuse) :Time device, remote device and impact device, battery operated etc
3. Container (body)- Tiffin carrier, transistor, cement pipe, iron pipe, telephone, Television, toys, cell-phone, computer, scooter, cycle, the articles which are easily available to the anti social elements.
4. Charge (explosive) - High explosives, Low explosives or combinations.
5. A power source (battery) -A power supply, often provided by car batteries or alkaline flashlight

## **COMMERCIAL COMPONENTS**

The components used in IEDs are easily-obtainable commercial goods, such as fertilizer, bleach (peroxide), nail polish remover, brake fluid, herbicides, disinfectants and cleaning solvents.

Commercial explosives and detonators for mining and construction are also sought-after components. IEDs may be packed with additional materials, such as nails or ball bearings, to enhance fragmentation.

Enhancements may also include copper plates, which can threaten the integrity of armoured vehicles and pose a particular threat to peacekeepers.

## **PRODUCTION AND DELIVERY**

IEDs are generally assembled outside of military production or mainstream commercial channels by individuals or groups. Bomb makers strive continuously to alter the characteristics, functioning or delivery context of a device.

IEDs generally consist of a switch, power source, initiator, container and explosives. Initiation methods include time-controlled, command-initiated, radio-controlled, and victim-operated systems. Main charges can be drawn from commercial or military explosives.

Casings can range from soda cans, plastic bags, pressure cookers and shoeboxes to suicide vests, gas cylinders and trucks. In some instances, booby traps meet the definition of an IED as well.

IEDs can be delivered by vehicle, boat, aircraft, or rocket launcher or by mail or strapped to a person or animal.

## **TYPES OF IEDS ON THE BASIS OF MATERIAL**

### **WARHEAD**

The Dictionary of Military and Associated Terms include two definitions for improvised devices: improvised explosive devices (IED) and improvised nuclear device (IND). These definitions address the Chemical, Biological, Radiological and Nuclear Explosive in CBRNe. That leaves chemical, biological and radiological undefined. Four definitions have been created to build on the structure of the JCS definition. Terms have been created to standardize the language of first responders and members of the military and to correlate the operational picture. The explosive and/or toxic material that is delivered by a missile, rocket

### **EXPLOSIVE**

A device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract. It may incorporate military stores, but is normally devised from non-military components. Example-gunpowder and high explosives(TNT, PETN, RDX).

### **CHEMICAL**

A device incorporating the toxic attributes of chemical materials designed to result in the dispersal of these toxic chemical materials for the purpose of creating a primary patho-physiological toxic effect (morbidity and mortality), or secondary psychological effect (causing fear and behaviour modification) on a larger population. Such devices may be fabricated in a completely improvised manner or may be an improvised modification to an existing weapon. Example- poison gas or nerve gas, which is designed kill human beings. Mercury Fulminate, Silver Fulminate.

### **BIOLOGICAL**

A device incorporating biological materials designed to result in the dispersal of vector borne biological material for the purpose of creating a primary patho-physiological toxic effect (morbidity and mortality), or secondary psychological effect (causing fear and behaviour modification) on a larger population. Such devices are fabricated in a completely improvised manner. An infectious agent, such as anthrax spores, is dispersed, which is designed to sicken or kill humans. Anthrax bacillus anthracis is an aerobic, gram- positive, non-motile spore former. Mainly the infection is caused by endospores which enter in the body through the skin/ mucosa or through inhalation.

## RADIOLOGICAL

A speculative device incorporating radioactive materials designed to result in the dispersal of radioactive material for the purpose of area denial and economic damage, and/or for the purpose of creating a primary patho-physiological toxic effect (morbidity and mortality), or secondary psychological effect (causing fear and behaviour modification) on a larger population. Such devices may be fabricated in a completely improvised manner or may be an improvised modification to an existing nuclear weapon. It is also called a Radiological Dispersion Device (RDD) or "dirty bomb".

### Common IEDs

1. **Throw-downs-** these bombs used frequently in India. They work on the same principle on which a similar cracker works. On throwing down, the bomb explodes due to the initiation by the impact on a sensitive material kept inside. Throw - down bombs are often balls of various sizes, the smallest effective bombs being over five centimeters in diameter. Suitable chlorate mixture, fulminates mixtures, other chemical mixtures or even electrical devices has been used to start the explosion. Silver Fulminate is used as detonator in throw down bombs.
2. **Fuse bombs-** these bombs are fitted with a fuse cord. Before throwing the bomb the fuse is lighted. The fuse cord of convenient length is used so that it does not explode while being thrown. The lighted fuse puts the explosive charge on fire and the device explodes. This is the easiest and safest arrangement for initiation.
3. **Time bomb-** time bombs are also known as clock or watch bombs. In time bombs the initiating device may be mechanical. For example, in a clock work a sensitive explosive is placed at the place where alarm hammer strikes. The material thus struck, gives out heat and flame and puts the explosive charge, placed close by, on fire. Terrorists have often used time bombs in their recent activities, extensively. The initiation device is usually electrical. At the set time, the clock completes electric circuit, containing a heating element at the relevant site. The heat puts the explosive on fire.
4. **Letter bomb-** a letter bomb is a booby trap. It must have limited dimensions and weight. Trigger methods of these devices use simple mechanical means or completion of electrical circuit employing pull pressure or tension release system. They are used to cause damage to the person and surroundings.
5. **Transistor Bomb:** Terrorist has used "transistor" bombs in recent times. Transistor bombs utilize the transistor shape cover to house the explosive and missiles, its electrical system and "on and off" wiring to initiate the bomb electrically. The cover of transistor is made of cast iron. Its fragments act as missiles which can kill and injure persons at long ranges.
6. **Magnetic bomb-** These bombs are usual time bombs having a moderately powerful magnet attached to the device. The magnet helps to fix the bombs with the cars of the victims.
7. **Human bomb-** Human bomb is an improvised device containing adequate quantities of high explosives and an initiating device. It is attached, in a hiding position, to the body of a person who has been made to sacrifice his life for a large sum. He approaches the victim, when the initiating device is triggered, usually through a remote control by the person who controls the killing assignment.

## CONCLUSION

IEDs have proved to be extremely effective in practice. They were responsible for thousands of military and civilian deaths in the wars. In countries where strict weapons controls are in place, IEDs seem to form an increasing alternative to illicit small arms.

The easy availability of ammunition stocks is major issue and causes easy development of improvised explosion devices. Failure to identify and secure such stockpiles in immediate post-conflict environments can have strategic implications for peace-building processes. Iraq should serve as a example of initial tactical military success leading to strategic failure due to ineffective planning for the immediate post-conflict environment.

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