FOR Zürich
Forensisches Institut

Explosives – How to blow up a cash machine

The Zurich Forensic Science Institute is responsible throughout Switzerland for the investigation of criminal incidents and accidents involving explosives. One of its many tasks is, in this context, to determine the used explosive.

After the blast of an explosive or an explosive mixture, traces of unexploded materials or reaction products of the explosive are normally located in the residues. With the use of chemical analysis, the explosive components contained in the gathered evidence can be identified.

The range of possible substances that can be involved, alone or in combination, is enormous. A small range of frequently used explosives and energetic materials are mentioned below.

- Chlorate/Perchlorate mixtures
- Ammonium nitrate / fuel oil (ANFO)
- Ammonium nitrate / Nitromethane (ANNM)
- Hexamethylene triperoxide diamine (HMTD)
- Triacetone triperoxide (TATP)
- Ethylene glycol dinitrate (EGDN)
- Methylammonium nitrate (Myrol)
- Pentaerythritol tetranitrate (PETN)
- Cyclotrimethylenetrinitramine (RDX)
- Nitroglycerine (NG)

Questions / discussion:

Since 2018 banks were a popular target for bomb attacks. In the border regions, especially near the border, several ATMs were blown up and the money was taken by unknown perpetrators. The groups always proceeded according to the same modus operandi: The cash dispenser of the ATM was forced open with a crowbar and a small package of explosives was placed inside the ATM. The explosives used were often HME (homemade explosives). Despite the small quantities, the damage to equipment and the building structure was severe, as can be seen in the picture below.

ATM post blast

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Based on the situation of a blown up ATM: Answer the following questions

1. What pieces of evidence would you consider important and how would you preserve them?
2. How would you prepare the gathered evidence for instrumental analysis?
3. What analytical methods would you propose for the determination of the diverse explosives components (mentioned at the beginning)? What are the advantages and disadvantages of the proposed methods?
4. Nitrocellulose is the one of the main ingredient in ammunition and is also used in blowing up ATMs. How can nitrocellulose be detected?
5. How would you blow up an ATM without leaving traces of explosives?
6. The map lists all ATM blasts from November 2018 to June 2022 in Switzerland and Principality of Liechtenstein. It is well known that the ATM burglars are diverse criminal groups. How can the individual ATMs be linked to each other and to the individual criminal groups? What kind of forensic methods could be used?

Literature:

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