

LES RAPPORTS DU GRIP



# THE TRACEABILITY OF AMMUNITION

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## Introduction

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Without ammunition, firearms would be pointless. They could neither wound nor kill. This statement of the obvious ought to set quite a few bells ringing in the international community, which has all too often been passive about drawing up firm international legislation on the issues raised by the production, use, transfer, stockpiling and destruction of ammunition.

This report is about the marking, but above all the traceability of ammunition. Getting the lifecycle of ammunition under control is just as important, if not more so, than controlling weapons themselves. After all, during an armed conflict or in areas of large-scale violence, ammunition supply is such a decisive factor that controlling the supply chain can certainly have a more direct impact on the length of a conflict than can controls on weapons themselves.

So marking, information recording and tracing are three key stages in the lifespan of ammunition, making for better control of ammunition proliferation. That point is well understood by the specialised NGOs, researchers and journalists dealing with these issues, who keep a close watch on ammunition in order to identify the world's biggest human rights violators and, by extension, those who support them.

Despite this significance, and the fact that in other economic sectors, marking and tracing are

common, well-established and often compulsory practices, the international community is anything but proactive on this issue. A cow can be traced from birth to slaughter. The origins of the components in a toy can be identified at every step in the production process. Barcodes let you follow, *live* online, the progress of the parcel that you have entrusted to an express courier. But when it comes to ammunition, no can do! If such follow-up is technically feasible for all kinds of goods, it must also be applied to these deadly metal objects.

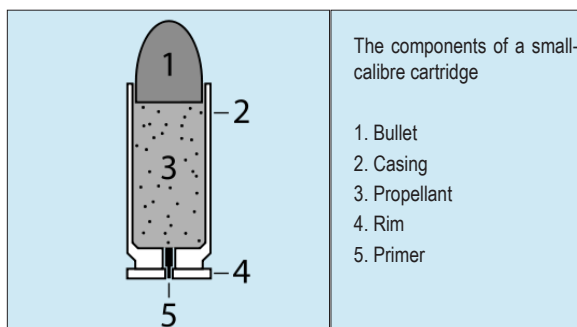
In reality, however, many actors would prefer ammunition to stay in the legal grey area that it currently occupies.

Regardless of the various interests involved, this report will show that no technical or technological barrier can any longer justify the absence or inadequacy of marking. It would enable appropriate recording of information concerning ammunition, which would thus become potentially traceable.



But this will require the international political will to embark on the necessary legislative reforms, for which enthusiasm is noticeably lacking in the upper echelons of States.

## 1. Glossary\*



### **Ammunition**

The term “ammunition” is applied to the whole corpus formed by the cartridge and its components, including the bullets and projectiles, cartridge cases, primers or capsules and propellants used in any small arms or light weapons.

### **Ammunition for small arms and light weapons**

Less than 20 mm in calibre, these cartridges are used for small calibre weapons (SALW), notably rifles, carbines, revolvers and assault rifles.

### **Bullet**

The bullet may be made entirely of one heavy metal or, as is often the case for military ammunition, of a brass/copper sleeve and a lead core, sometimes topped off with a steel tip. Its shape can range from an ogive with a pointed tip to a cylinder with a flat tip. Its form and composition govern its characteristics in flight as well as the effect at the moment of impact on the target.

### **Casing**

A cartridge case contains the primer, the propellant and the projectile. The casing is the only component that can be re-used. The casing has thermal absorption properties that protect the barrel of the gun during firing<sup>1</sup>.

### **Drill ammunition**

Designed and manufactured specifically for the instruction and training of forces while on

exercise, it is coloured white or silver in the case of personal weapons and blue for the other types of ammunition.

### **Inert ammunition**

This does not contain any active substances and is used for purposes of identification (being only outwardly identical to live ammunition) or for handling during instruction (its weight and size being identical to those of live ammunition). Different markings assure the user that no active substances are present: orange colour, the word INERT, cold marking or a hole in the casing.

### **Live ammunition**

Used on missions or operations, but also in firing instruction and training for armed forces, it bears various colours according to its charge or impact.

### **Lotting**

Ammunition consisting of the same, homogeneous products, manufactured under identical conditions is lotted – i.e. consigned to lots within the shortest possible time-span. The lotting is generally performed by the manufacturer. It is represented by:

- > a serial number specific to each manufacturer or establishment;
- > the initials or monogram of the manufacturer or establishment;
- > the year of manufacture.

These markings (code and lot number) are employed throughout the ammunition’s life, both by the manufacturers and by the users. So traceability is partially assured, but needs to be improved.

### **Marking**

Marking is the application of distinctive marks to the ammunition and the box in which it is packed. For purposes of identification but also information (the age or potential hazards of the ammunition), it may include colours, descriptive texts and/or symbols.

### **Primer**

A small metal cap containing an explosive. When the primer is squeezed or hit by the trigger, a spark is generated which ignites the propellant.

1. *Small Arms Survey 2005*, Small Arms Survey, Geneva.

Primers are primary explosives which belong to the category of high explosives (like dynamite and TNT). They are very sensitive to shocks and heat, both of which can set them off.

### **Projectile**

Depending on the intended use, different types of bullet may be produced: round (the commonest type), armour-piercing (with a harder core), tracer (containing a chemical in its base which leaves a luminous trail showing the bullet's trajectory), incendiary (containing a chemical which ignites upon firing), for range-finding or observation (containing a chemical which produces a sudden light upon firing). Bullets may be ogival or cylindrical and the tip may be rounded, flat ("wadcutter") or semi-flat ("semi-wadcutter"). A bullet may be full metal jacket (i.e. entirely encased in a hard metal shell) or not<sup>2</sup>.

### **Propellant**

The propellant is a granular material which burns rapidly, causing a sudden expansion of the gas which propels the bullet. Stabilising substances are added to it in order to prolong the useful life of the ammunition. This is because the propellant deteriorates over time, leading to unpredictable performance and, in extreme cases, the spontaneous combustion of the propellant. Dampness, strong temperature swings and open-air exposure of the ammunition without its packaging accelerate the deterioration process and cause the corrosion of the metallic elements in the ammunition. Under the right storage conditions, small-calibre ammunition can keep for 50 years.

### **Rim**

The rim is the end part of the ammunition. Notably, it is where the inscriptions are placed.

### **Tracing**

A process enabling identification of the ammunition, its origins, its type and its transfers.

### **Transfer**

The import, export, transit, transshipment, trading or transport of ammunition.

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2. *Small Arms Survey 2005*, Small Arms Survey, Geneva.

## The path taken by military ammunition in France<sup>1</sup>

### Stage 1 – From the manufacturer to the depot

*When a manufacturer delivers ammunition to one of the Army's ten depots in metropolitan France, it is inspected on arrival. After being registered by the armourers, it is stockpiled in a warehouse corresponding to its degree of explosion hazard.*

*The ammunition is then checked at three levels:*

- > bookkeeping: counts – both planned and random – are carried out by personnel external to the “ammunition” role*
- > external appearance: a check to verify the ammunition is scheduled regularly*
- > technical tests: a sample is taken from the ammunition lot concerned and is repeatedly tested down the years to ensure its operational effectiveness and safety.*

*Part of this ammunition is stocked for future theatres of operation, and part for the instruction and training of forces.*

### Stage 2 – From the depot to the regiment

*Each regiment is assigned to an ammunition depot. The stocks are managed by the regimental armourer \*\*, who is accredited by the regiment's commander. Each year, the Army general staff (EMAT) draws up policies for the firing of ammunition. The Army Formation Command (CoFAT) allocates ammunition in accordance with instruction and training activities.*

*To prepare their orders for ammunition, regimental armourers use the computerised system for the distribution of training ammunition (SIREMI). They then go to the depot to take delivery of the ammunition ordered, which is stockpiled in the regiment's own warehouse.*

### Stage 3 – Within the regiment

*The ammunition is distributed among the basic units in line with the activities scheduled. Before each exercise, the NCO i/c ammunition - as designated by the basic unit - orders, inventorises and receives the quantity of cartridges needed, using the SIREMI.*

*During firing practice, the ammunition is handed out shot by shot. Any ammunition not used is counted by the firing supervisor. It is inventorised again by the regimental armourer when it is returned by the NCO i/c ammunition of the unit concerned. The inventory documents, the ammunition debris and the unused ammunition are then checked against each other.*

*Qualitative and quantitative checks are carried out each year by the head of the regiment's logistical maintenance office, and every two years by the Army regional ammunition team. All ammunition that has remained with a regiment for one year is required to be returned to the depot.*

*\* Firing accident: when material or physical damage results. Firing incident: when a malfunction is noted.*

*\*\* NCOs who are armourers have undergone special training at the École supérieure et d'application du matériel (ESAM) in Bourges, a national course for “corps armourers” and training in the use of the computerised ammunition management system (SIREMI).*

1. [http://www.defense.gouv.fr/terre/actualite\\_et\\_dossiers/le\\_parcours\\_d\\_une\\_munition](http://www.defense.gouv.fr/terre/actualite_et_dossiers/le_parcours_d_une_munition)



## 2. Marking ammunition<sup>3</sup>



Sources : [www.bavarianm1carbines.com/](http://www.bavarianm1carbines.com/)

Marking provides information enabling the ammunition to be located in a database.

So there can be no doubt about the need for systematic marking of ammunition.

This is a basic security norm, which is useful when handling ammunition, but it also helps to counter any attempts at misappropriation.

Marking is therefore an essential precondition for all other complementary measures, notably those aimed at optimising stock management procedures, such as registration.

This chapter reviews the most common practices in the marking of conventional ammunition.

In terms of safety, marking facilitates the classification of ammunition in relation to the existing safety procedures. Thus, markings may show the type of explosive, the propellant contained in the cartridge and the range of explosion and contamination hazards during handling.

In this way, the information provided by marking enables the handling personnel to comply with certain procedures specific to the handling of different types of ammunition.

Current marking practices are also useful for ensuring that the security forces receive the appropriate types of ammunition. The information shows which type of ammunition goes with which weapon. Such distinctions have a crucial safety role, as incorrect use can cause accidents.

Adequate marking would greatly reduce the risk associated with the loss, theft or black market distribution of ammunition.

### What information is needed for effective marking ?

Ideally, effective marking should encompass the information needed for tracing, and such additional details as would ensure effective follow-up :

#### Essential information

1. The type (calibre) of ammunition
2. The unique production lot number
3. The manufacturer (initials)
4. The country of origin
5. The year of manufacture

#### Additional information

6. The type of propellant
7. The type of explosive
8. Any modifications made to the ammunition
9. The status of the ammunition (in service/out of service)
10. The stamp of the test bench

Effective management of ammunition, or of ammunition stocks, implies that personnel should keep a trace, in a register, of any movement of ammunition (including relocation of stocks and transfers within or between stocks).

Marked ammunition



Unmarked ammunition



HP : Hirtenberger Patronen Zundhutzen  
3-76 : 3rd lot in 1976.  
9 : calibre of the cartridge

### The principles of marking

The effective classification of ammunition requires a clear, readable and readily understandable system. Two basic principles govern marking methods:

**1) The clarity principle:** the indications must be easy to read off. To facilitate rapid reading, important information should be bigger than secondary information. Complicated symbols or superimposed colours are inadvisable.

3. In *Conventional Ammunition in surplus – Ch. 3 Conventional ammunition marking*, Pablo Dreyfus, Small Arms Survey, 01/2008.

2) **The uniformity principle:** the style and the position of the indications should be coherent within stocks that have similar characteristics, thus minimising the risk that the personnel working with these stocks will make mistakes.

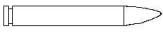

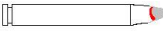





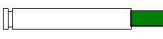
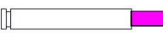
Practical marking is therefore essential, particularly when different countries take part in joint military operations involving ammunition of various origins.

To illustrate the need for coherent marking when several countries are active together in va-

rious theatres of operations, we will present here both the **NATO standards**<sup>4</sup> and the **CIFTA model legislation project** on the marking of firearms and ammunition drawn up by the Technical Se-

<sup>4</sup> Technical standards provided by the NATO Maintenance and Supply Agency (NAMSA). As NATO's main logistical support agency, NAMSA's mission is to provide logistical support services for the arms systems and materiel held in common by the NATO countries. It operates according to the principles of grouped logistical needs, centralised activities and logistical resources, and competition between industrialists. For more information, see <http://www.namsa.nato.int/>

### The principles of standard ammunition marking

Medium	Application	Observations	
Paint	The paint shows the type of use for which the ammunition is intended (training, live firing etc.) and its explosion hazard.	NB: in some cases, the use and choice of colour has no significance.	
	<b>Ammunition below 20 mm in calibre</b>		
	 White: ordinary bullet cartridge		
	 Red: tracer bullet cartridge		
	 Silver and red: armour-piercing incendiary tracer bullet cartridge		
	 Silver: armour-piercing incendiary bullet cartridge		
	 Blue: incendiary bullet cartridge		
	 Blue and red: incendiary tracer bullet cartridge		
	 Black: armour-piercing bullet cartridge		
	 Black and red: armour-piercing tracer bullet cartridge		
	 Green: blank paper cartridge		
 Violet: blank wooden cartridge			
Yellow	Identifies high-explosive ammunition		
Brown	Identifies low-explosive ammunition		
Grey	Identifies ammunition containing chemical agents		
Dark Green	Identifies a toxic chemical agent		
Dark Mauve	Identifies an incapacitating agent		
<b>Ammunition above 20 mm in calibre</b>			
Code	The coding entails applying bands of colour and symbols to the ammunition or its packaging. These codes may give indications of the type of explosive components.	The code is very often accompanied by a text, making the read-off more explicit.	
Lettering	Letters, numbers and/or abbreviations are applied to the ammunition or its packaging by means of printing or other processes.	Lettering in black and white does not have any particular significance.	

cretariat of the CIFTA-CICAD Group of Experts<sup>5</sup>, within the framework of the Organisation of American States (OAS).

### A. The NATO codes

The NATO marking and classification systems for ammunition are quite illustrative<sup>6</sup>.

The basic information is inscribed on the base of the cartridge and is supplemented by the use of the colour showing the type of bullet and the precise use of each cartridge (training, operations etc.).

### B. The CIFTA draft model legislation

The 1999 resolution of the OAS General Assembly provided for the creation of a group of experts charged with drawing up model legislation on the issues envisaged in the CIFTA. In 2006, this group put forward draft model legislation which devoted a chapter to the marking of ammunition. It reads as follows<sup>7</sup>.

#### Article 4 : Marking of Ammunition

(1) Every person who manufactures ammunition shall ensure that each cartridge is marked at the time of manufacture, in the manner set out in Article 5.1.









(2) Every person who manufactures ammunition shall ensure that each box of ammunition is marked at the time of manufacture, in the manner set out in Article 5(3) and, as applicable, Article 5.4.

(3) Every person who imports ammunition shall ensure that, in addition to the cartridge marking referred to in paragraph (1), each box of imported ammunition is marked in the manner set out in Article 5.3 and 5.4.

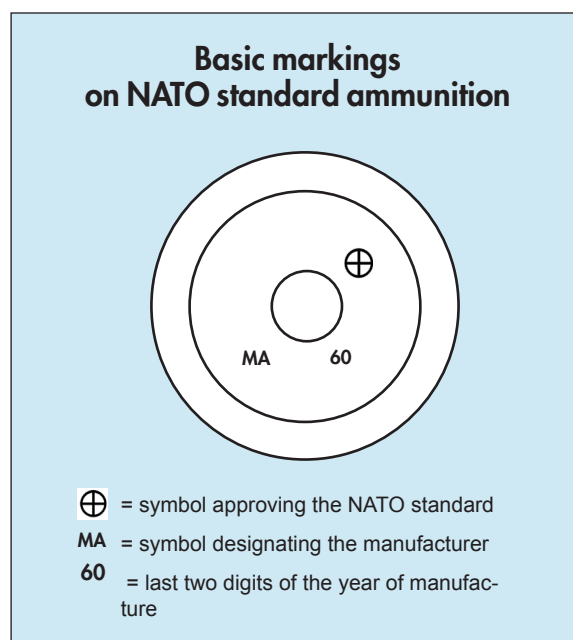
5. 26 States in the Americas are members of CIFTA (Inter-American Convention Against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives, and Other Related Materials).

6. See the website of NATO's ammunition database at [http://www.namsa.nato.int/inits/nadb\\_e.htm](http://www.namsa.nato.int/inits/nadb_e.htm) and the NATO master catalogue of references for logistics at [http://www.nato.int/structur/AC/135/nmcr/nmcr\\_e/chapters/3\\_data\\_contents\\_e.htm](http://www.nato.int/structur/AC/135/nmcr/nmcr_e/chapters/3_data_contents_e.htm)

7. The full text of the Draft Proposed Model Legislation on the Marking and Tracing of Firearms and Ammunition is online at [http://www.oas.org/juridico/english/cifta\\_mod\\_leg\\_markings.pdf](http://www.oas.org/juridico/english/cifta_mod_leg_markings.pdf)

Main symbols for "NATO standard" artillery ammunition		
Marking or symbol		Meaning
NATO symbol		The ammunition complies with NATO standards
Symbol of interchangeability		The ammunition is interchangeable
Parachute symbol		Indicates the presence of a parachute attached to an illuminating or signalling device
Radar echo symbol		Indicates the presence of a radar echo device
Temperature limitation symbol		Indicates the minimum and maximum temperatures for transit and storage
Temperature limitation symbol		Indicates the minimum and maximum temperatures for use
Sound/RADA sound symbol		Indicates the presence of a sound/RADA sound device
Tracer symbol		Indicates the presence of a tracer device

Source : Marking of ammunition and associated packages – Part 1 (Mod – UK)



#### Article 5 : Manner of Marking

(1) Each cartridge shall be permanently marked by a headstamp impressed, stamped or embossed that identifies the manufacturer, the country and year of manufacture, and a unique batch or lot number.

(2) Headstamp markings on cartridges shall:

(a) consist of simple geometric symbols in

combination with a numeric and/or alphanumeric code;

(b) be of a size that is readily legible to the naked eye; and

(c) be of a quality and/or depth such that the markings cannot be readily tampered with or removed.

(3) Each box of ammunition shall be marked with

(a) the same identification as on the headstamp marking referred to in paragraph 2;

(b) the unique batch or lot number of the ammunition in the box.

(4) Each box of imported ammunition shall contain, in addition to the marking referred to in paragraph 3, information that identifies the country of import, the year of import and the importer.

### *Lot numbering*

This consists of a code that is systematically associated with each lot at the time of its manufacture, assembly or modification. It identifies the quantity of ammunition assembled from the same components and under the same conditions, implying that all of the ammunition in this lot will function identically.

Used in addition to book-keeping procedures, lot numbering also makes it possible to trace the locality or movement of certain ammunition lots.

On the safety side, lot numbering enables the identification – and where necessary the recall – of defective lots that might cause incidents in an ammunition depot.

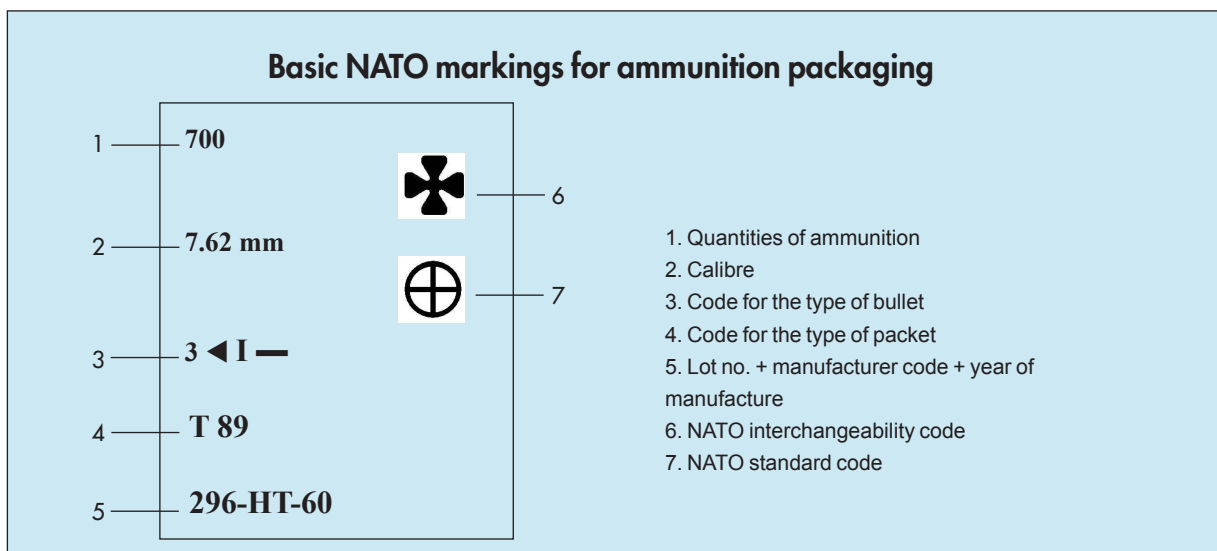
In the case of ammunition for light weapons, the lot numbers feature on the packaging rather than the cartridge, because of its small size. Inscription on the cartridge itself is not a standardised practice in many countries, as they feel that the cost is a barrier to the generalisation of this practice. This cost-based argument is not very convincing if the cost of the marking equipment is compared with the profits derived from the sale of ammunition. In any case, if all the manufacturers are obliged by law to “mark” their ammunition, this cost will be built into the selling price of all ammunition.

But to date, only a few countries have adopted this principle for the ammunition used by their security forces.

Overall, the effectiveness of marking ammunition lots is a moot point. Many observers stress that this procedure is too superficial to deter the traffickers. However, where unique lot numbers and adequate registers are lacking, the tracing of ammunition is a rather difficult task.

### *Marking of packaging*

Marking the packaging is crucial to safety in the handling and transport, but also the storage, of ammunition. Appropriate labelling of boxes and containers does, of course, imply reproduction of the same symbols and lettering as used on ammunition. In some cases, the packaging will bear certain symbols indicating the hazards linked to the presence of explosives. These symbols will need to be hierarchised, so making clear the main and secondary hazards in the case of an accident.



### 3. Tracing ammunition

Tracing consists of going back up the pathway taken by the ammunition, so as to identify the point at which it was diverted into illicit use, as well as determining any responsibilities borne by the actors involved in the circuit. Tracing is not done through marking. Rather, it takes the information provided by marking as its starting point. Marking is a necessary but not a sufficient condition of tracing.

So tracing is a collection of methods used to identify a piece of ammunition, starting at its place of manufacture and continuing through its various transfers. Tracing is the ability to identify and follow ammunition and ammunition lots right from the source, with maximum potential for the discouragement of any illicit trafficking.

Two preconditions are essential for tracing:

- that the ammunition has been marked;
- that the information relating to the marked ammunition has been recorded and stored in a database, thus enabling later research.

In June 2008, the organisation Small Arms Survey published *Ammunition tracing kit - Protocols and procedures for recording small-calibre ammunition*, a teaching manual accompanied by practical tools designed to organise the information gathered during an ammunition tracing operation<sup>8</sup>.

#### Why trace ammunition ?

Tracing can be used for various purposes:

- identifying a manufacturer or a certain category of ammunition;
- enabling more complex studies aimed at analysing ammunition transfer models;
- monitoring illicit trafficking or identifying the origin of ammunition which was legally transferred but then diverted into the illicit circuit<sup>9</sup>.

8. In *Ammunition tracing kit - Protocols and procedures for recording small-calibre ammunition*, Small Arms Survey, June 2008. Available at [http://www.smallarmssurvey.org/files/sas/publications/b\\_series\\_pdf/ATK/ATK%20subsections/ATK%20prelims.pdf](http://www.smallarmssurvey.org/files/sas/publications/b_series_pdf/ATK/ATK%20subsections/ATK%20prelims.pdf)

9. In *Ammunition tracing kit*, op. cit.

#### The phases of ammunition tracing

In tracing ammunition found in a theatre of operations, it is important to distinguish between three phases:

##### - identification

The tracing procedure begins with the collection of information on the physical characteristics of the ammunition, in order to determine the identity of the manufacturer, the date of manufacture, the country of origin and the calibre of the ammunition.

For various reasons, certifying the identity of ammunition is undoubtedly a useful exercise. Each piece of information gathered, however tiny, constitutes a potential resource that can be stored in a global database and can thus help to analyse the circulation of ammunition worldwide.

##### - mapping

This stage requires the recording of ammunition samples drawn from different localities or groups, so that this information can be used to build up a detailed “photograph” of the transfer methods for this ammunition.

Mapping entails the identification of the ammunition, as well as its location or details of the group using it at the time it was recorded.

Mapping may be general, indicating the country in which the ammunition was recorded; or specific, noting the identities of the groups using this ammunition.

Mapping requires a wide range of ammunition samples, in order to establish whether the presence or absence of certain items is significant or not when arriving at conclusions.

##### - verification

This stage is a useful check on each assumption drawn from the trends that show up in the mapping. It may suggest possible links between the types of ammunition found in different places.

As a general rule, if the discoveries made during mapping point to the possible implication of one or another group in illicit transfer activities, these discoveries can never be passed on without first cross-checking the information by means of additional research, notably:

- with resource persons encountered in the immediate geographical area of the discovery;



- with people who are not directly linked to the arms transfers but who, by virtue of their functions or work, may have a relevant viewpoint on the finds;
- through enquiries in political and/or military circles;
- through enquiries to gain a better insight into the dynamics of the armed conflicts or the criminal groups;
- by sending the conclusions of reports to those concerned in order to stimulate responses that may add to or refine certain research hypotheses.

The verification phase may also draw on research specifically oriented towards this topic or specialised work on the dynamics of armed conflicts.

The dissemination of insufficiently verified information creates a twofold risk:

- it may compromise research in progress on the ammunition trade;
- it may adversely affect any regional political processes/negotiations that are underway.

### **Two forms of tracing**

#### **- direct identification by means of the markings on the ammunition**

This procedure entails analysis of the data drawn from the markings in order to identify the manufacturing origins. Most conventional ammunition is marked at the time of manufacture and provides basic information for the management and safety of stocks.

This tracing procedure can be particularly useful for identifying cases of diversion at the time of manufacture or of first possession.

However, the determination of origins is not enough to trace the career of a piece of ammunition. This information item covers only part of that pathway and must be supplemented by other items.

#### **- indirect identification**

In most cases, tracing ammunition requires more than a simple analysis of the markings. In the absence of a marking that identifies the first recipient – and thus necessarily the following ones – it becomes impossible to assign ownership of a piece of ammunition to a person or group.

Ammunition markings are never the one and only means of tracing. Even a marked ammuni-

tion lot may have been transferred several times before it was diverted from its original purpose. But markings, combined with thorough analysis of the sales contract, should be enough to start with when launching an enquiry into the sources of illicit proliferation.

### **Some additional tracing methods**

Marking can only indicate the last or next-to-last source. It can never point to any intermediate source that may have been involved in the transfer.

A certain number of methods need to be applied in order to complement the tracing and establish a better cross-linkage:

1. precise studies of materiel acquisition worldwide (studies identifying which types of ammunition are circulating among which States and how they have been marked);
2. in parallel, comparative studies of the types of illicit ammunition and their markings (ammunition found at the scene of a past conflict or crime);
3. analysis of fairly broad politico-economic factors, which may include the diversion of ammunition onto the illegal market.

The tracing of ammunition is an important means of identifying the sources of ammunition on the illegal market. Full marking, including the unique marking of ammunition lots, would of course greatly facilitate research.

Lot marking<sup>10</sup>, combined with improvements in recording and book-keeping, would also provide States with a means of detecting diversions from national stocks. In States where the control and surveillance of personnel are often ineffective, lot marking could also be a valuable form of back-up surveillance.

These days, there is growing international interest in the tracing of ammunition. This interest is confirmed by the research developed by certain bodies or study centres with the aim of refining existing methods and/or experimenting with new approaches. In this regard, greater transparency on the part of States is more than necessary, but quite clearly, too few countries are currently prepared to make this type of information public.

10. James Bevan and Pablo Dreyfus, *Small arms ammunition lot marking*, in "Conventional Ammunition in surplus", Small Arms Survey, 2008.

## 4. International legislation – the state of play

Although international non-governmental organisations and certain States have been urging it for many years now, specific legislation on ammunition has still not seen the light of day. It is often included in the instruments governing small arms and light weapons, rather than being tackled specifically.

In July 2008, in New York, participants in the Third Biennial Meeting of States to Consider the Implementation of the Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons (SALW) in All Its Aspects examined the implementation of the International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (ITI). Adopted in 2005 by the United Nations General Assembly, this Instrument was created to support the 2001 Programme of Action [1]. It represents a modest but important step within the framework of measures aimed at combating SALW proliferation. It strengthens international standards on the marking and recording of firearms and, for the first time, establishes a tracing mechanism at the global level.

However, as adopted, it is far from being effectively usable, as it is not legally binding on States. Also, ammunition is excluded from the scope of the Instrument. Based on a bilateral, voluntary mechanism, its implementation is patchy, as some States will not countenance any kind of international constraint. On the other hand, through this Instrument, all the ingredients are provided for States that do wish to achieve effective control of the circuit for SALW and their ammunition, from the time of manufacture, as long as their interlocutors are willing to cooperate.

At the end of this Third Biennial Meeting, the representative of Norway, echoing NGO criticisms, had some very harsh things to say about this Instrument. It was, he stressed, no longer possible to overlook the fact that the ammunition issue was not being examined in all its aspects. He also recalled that laser marking could prevent diversion and facilitate the incrimination of arms traffickers. He invited States to integrate into their report informa-

tion on the management of ammunition. In future, the integration of ammunition into the Instrument on traceability should be envisaged<sup>11</sup>.

The UN Group of Experts on ammunition (which, be it recalled, was created on the basis of the recommendations in paragraph 27 of the Instrument on traceability) did, for its part, provide a series of national, regional and global recommendations to the UN General Secretary in July 2008. Those recommendations were approved by the General Assembly and embodied in a resolution adopted in December 2008. At the world level, the Group notably recommends the elaboration of a technical guide to the management of conventional ammunition stocks. This guide would be available to States that wish to strengthen their national capacities.

So despite some progress, the UN Group of Experts has not been able to reach consensus on the details of certain measures that could prove relevant to the tracing of illicit ammunition. And indeed, some States opposed any reference to the practice of lot-marking ammunition as a means of strengthening national stockpile management practices. However, the Working Group that will deal with the technical guide could possibly build into it practices that would help to improve the traceability of ammunition. In particular, it could draw inspiration from the OSCE-developed best practice guide on conventional ammunition and the guide being developed by the United Nations Office on Drugs and Crime (UNODC) in the framework of the Firearms Protocol.

Ultimately, the Brazilian legislation is still setting an example, even today.

The Brazilian law on disarmament is clearly still at the forefront of international progress. Adopted in December 2003 under pressure from a number of Brazilian NGOs (notably *Viva Rio* in Rio de Janeiro and the *Sou da Paz Institute* in São Paulo), it was a response to the frequent diversion of the security forces' stockpiles and the high levels of violence. It establishes a series of measures designed to control the sale and possession of firearms and to ban the carrying of weapons by everyone except the police, members of the armed forces

11. For further reading: ANDERS Holger, *Ammunition stockpile controls: further steps at the global level*. GRIP Analysis Note, 19 December 2008, Brussels. URL: [http://www.grip.org/fr/siteweb/images/NOTES\\_ANALYSE/2008/NA\\_2008-12-19\\_EN\\_H-ANDERS.pdf](http://www.grip.org/fr/siteweb/images/NOTES_ANALYSE/2008/NA_2008-12-19_EN_H-ANDERS.pdf)

## Rappel des principaux instruments globaux et régionaux évoquant la traçabilité des munitions

<b>Global instruments</b>		
1991	<b>United Nations Register of Conventional Arms</b>	The Register is mainly a collection of information on military holding companies and sales contract procedures. It invites States to develop relevant policies on the acquisition and management of weapons and ammunition. Since 2006, States that so wish can also provide information on SALW.
2001	<b>UN Firearms Protocol<sup>1</sup></b>	The UN Firearms Protocol, which came into force on 3 July 2005, put into place a new international instrument aimed at combating the illicit manufacture and trafficking of light weapons, including among others handguns, machine pistols and small calibre rockets. Its scope is limited to commercial transfers, so State-to-State transfers are excluded, except in their commercial aspects. It includes ammunition and firearms components. However, ammunition is not covered by the marking and tracing provisions. A best practice guide on the implementation of the Protocol, including the marking of ammunition, is being finalised and should be published during 2009.
2001	<b>United Nations Programme of Action<sup>2</sup></b>	The Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (PoA) is the final document adopted by the Conference. It is often regarded as the international instrument par excellence for preventing, combating and eradicating the illicit trade in SALW. Yet this document does not give a clear definition of SALW, so it fudges the ammunition issue. And indeed, some States consider that they are outside the frame of this instrument, even though the generic term does include ammunition, according to the definition of the 1997 UN Group of Experts on SALW <sup>3</sup> .
2005	<b>International Tracing Instrument</b>	The ITI is one of the outcomes of the PoA which, following an expert study, recommended that an international instrument be negotiated for the tracing of small arms and light weapons. The negotiations, held under United Nations auspices in 2004-05, led to agreement on an international tracing instrument. This was officially adopted by the United Nations General Assembly in December 2005. Although the great majority of the States that took a position on the subject during the negotiations on tracing wanted a treaty, the International Tracing Instrument is based on a voluntary bilateral mechanism, rather than on a legally binding multilateral mechanism. Nor does it tackle the issue of ammunition – an important omission which may be rectified in the near future.
<b>Regional instruments</b>		
1997	<b>Convention of the Organisation of American States</b>	This Convention covers all conventional ammunition, but does not refer to stockpile security. On the other hand, it does concern security issues linked to the import, export and transit of ammunition.
2001	<b>SADC Firearms Protocol</b>	This Protocol on firearms in the Southern African Development Community (SADC) region was the first legally binding subregional instrument in Africa. It aims to promote efforts to combat the illicit trade in firearms. Controls on ammunition are an integral part of the Protocol. Thus, it aims to combat the illicit manufacture of ammunition for firearms, their excessive and destabilising accumulation, their trafficking, their possession and their use in the region. To that end, it provides for a series of international measures to reinforce national legislations, controls on SALW held by civilians and States, marking and registration, information exchange and transparency.

1. See the Analysis Note *Protocole des Nations unies sur les armes à feu : état de son application et mise en œuvre dans l'Union européenne*, Ilhan Berkol, 11 April 2008. Online at <http://www.grip.org/bdg/pdf/g0925.pdf>  
 2. See the Information Note *La Conférence d'évaluation du Programme d'action des Nations unies sur les armes légères et de petit calibre (ALPC) – New York, 26 juin – 7 juillet 2006*, Ilhan Berkol, 22 June 2006. Available at <http://www.grip.org/bdg/g1051.html>  
 3. Paragraph 26 of UN Document A/52/298, 5 November 1997.



2003	<b>OSCE Document on Stockpiles of Conventional Ammunition<sup>4</sup></b>	The Document mainly concerns ammunition stockpiles, management and the destruction of surpluses. In 2008, the OSCE also published an <i>OSCE Handbook of Best Practices on Conventional Ammunition</i> . <sup>5</sup>
2003	<b>Wassenaar Arrangement</b>	In its list of ammunition, the Wassenaar Arrangement includes all types of conventional ammunition. It concentrates on the transfer of weapons and ammunition and their impact on regional and international stability.
2004	<b>Nairobi Protocol<sup>6</sup></b>	Ammunition is explicitly mentioned in the Nairobi Protocol, which is legally binding. However, it does not set out detailed standards for ammunition control. Nor does it at any point make ammunition part of a generic category covering small arms and light weapons. The good practice guide, for its part, stipulates that the scope of the Nairobi Protocol also includes ammunition for small arms and light weapons. And it lists some measures for the specific control of ammunition.
2006	<b>The ECOWAS Convention on small arms and light weapons, their ammunition and other related materials</b>	This Convention is legally binding. Ammunition is included in its title, and it provides a definition of ammunition. The Convention also provides for the specific marking of ammunition.

4. The full text is available at [http://www.osce.org/documents/fsc/2003/11/1379\\_en.pdf](http://www.osce.org/documents/fsc/2003/11/1379_en.pdf)

5. See [http://www.osce.org/fsc/item\\_11\\_32978.html](http://www.osce.org/fsc/item_11_32978.html)

6. The full text is available at <http://www.grip.org/bdg/g4552.html>

*At the present time, no functional international instrument exists for the tracing of ammunition and the control of its transfer. (Some documents do exist at the regional level, such as the ECOWAS Convention on SALW, but they have not yet come into force). And yet ammunition is the only possible tracer for arms that are already on the illicit market. Following the ammunition can lead to the discovery of the weapons.*

and municipal guards in cities with more than 250,000 inhabitants.

### **Brazil's Disarmament Law<sup>12</sup>**

On 22 December 2003, Federal Law No. 10.826 – the law on disarmament – was finally adopted by vote. It was the fruit of a whole decade of activism in support of a federal law that would establish strict controls on the circulation and use of light weapons. Apart from a ban on the bearing of arms by civilians and a call for a referendum on banning the sale of light weapons and ammunition to civilians (scheduled for October 2005), it contains provisions aimed at the light weapon and ammunition industry. The measures require a compulsory electronic connection between the databases of the army (which controls manufacture, imports and exports) and of the Brazilian federal police (which the new law tasks with centralising the registration data and information on confiscated weapons and ammunition). Previously, a lack of communication and the absence of information exchange between these two institutions prevented

efficient action against diversion and trafficking. The law also provides for a centralised ballistic information system run by the Brazilian federal police, which will contain samples of bullets fired from each small arm and light weapon manufactured in Brazil. This should make it possible to identify light weapons used during crimes.

As for ammunition, the new law stipulates that the stamps on bullets with a calibre of 5.56 mm, .30, 7.62 mm, 9 mm, .357, .38, .40, .45 and .50, as well as calibre 12 hunting cartridges made in Brazil for the police and the armed forces should include the lot number. This measure should improve the security of military and police stockpiles, as the police will be able to identify the leaks (of ammunition) from each of the two institutions towards organised crime. The penalties provided for in the law should be sufficiently dissuasive: trafficking and diversion of ammunition and the theft and illicit stockpiling of ammunition, which are covered by Articles 17 (“illicit trading in firearms”) and 18 (“international arms trafficking”), attract prison terms of 8 to 16 years.

The law could also promote the identification of those who carry out summary executions, through an analysis of the lot numbers engraved on the

12. *Crime and Ammunition Procurement: the case of Brazil*, Pablo Dreyfus, Small Arms Survey, 2006.

cartridge cases found at the scenes of the shootings. With a bit of luck, these measures could lead to a virtuous circle in which police units would feel obliged to improve their training levels and to avoid using firearms except in cases of absolute need.

### **Transport of dangerous goods**

Ammunition, like explosives, has the characteristic of being regarded as a dangerous product. So, as regards packaging for transport and stockpiling, it has to gain the approval of an institution recognised by the exporting country, while complying with the international regulations governing the transport of dangerous goods. The aim of these regulations is to guarantee the safety of the public and of the personnel involved in the transport and stockpiling, so they set out to increase the harmonisation of national and international practices.

The acceptance of this system by a large number of States for the classification, designation, packaging, marking, labelling and documentation of dangerous goods has led to the simplification of transport and handling operations, including stockpiling, and has speeded up the establishment of stricter control measures. Elaborated by the United Nations Committee of Experts since December 1996<sup>13</sup>, these regulations are revised every two years and the amendments come into force on 1 January of the following year.

#### **A concrete example of traceability**

The packaging is subjected to drop and stack tests, in order to ensure compliance, and is then marked with a four-digit UN (United Nations) number indicating the category and type of ammunition. Letters are added to show the country and the exporter. A certificate of approval is provided by the ministry department concerned with a view to export<sup>14</sup>. The approval of packaging, particularly for dangerous goods that are to be

transported, is carried out by officially recognised bodies throughout Europe. At the time of export, customs officers check that the packaging and the inscriptions on it are in compliance.

The UN Committee of Experts also recommends that all companies operating in this sphere should submit themselves to at least one external check per year, the aim being to verify the markings and the durability of the packaging<sup>15</sup>.

In addition, manufacturers are to ensure that in-house checks are performed on their packaging. To that end, they must select a monitoring body approved by their country's authorities<sup>16</sup>. In particular, so as to establish responsibilities in case of problems, the raw materials for the manufacturing should be traceable.

The four modes of transport (road, sea, air and rail) are all concerned. Companies should present a detailed annual report of activities for each mode of transport. The registers should be conserved for at least 5 years by the companies. For their part, the control bodies must ensure the conservation of the information, which they can divulge only with the agreement of the ministries concerned, in the case of an enquiry. So there is a major degree of confidentiality in the system. As for the transport agencies, they must ensure that the transport documents are in order and report any infringements or anomalies that they may observe.

So during transport, the merchandise and its origin are recognisable anywhere in the world. But this applies only to the packaging, and not to the marking or the checking of the ammunition itself. So it is fair to say that it is the trace of the packaging that is followed, and not that of its contents. And yet this case does show that it is possible to reach international consensus on the issue. So the international regulations on packaging could be extended to the marking of light weapons and ammunition themselves - such marking to be checked, at the time of dispatch, by the approved bodies. It should be emphasised that these bodies' operating costs are covered by the customers, on

13. i.e. the United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods: *Recommendations on the Transport of Dangerous Goods*, UN Model Regulation ref. ST/SG/AC10/1/rev.12, 15th revised edition, October 2007, Geneva and New York.

14. Wittebolle Maxence, *Rol en functie van het transport verpakkingen van gevaarlijke goederen*, Belgisch Verpakkingeninstituut vzw (Belgian Packaging Institute), 1997.

15. In some countries, such as Belgium, when an infringement takes place, all of the packages that have been produced in this category are verified and those that are non-compliant are destroyed.

16. A number of bodies exist in Europe and are recognised by various countries across the world: the *Institut belge de l'emballage* (IBE) in Belgium; the *Bureau des vérifications techniques* (BVT) in France; the *Bundesanstalt für Materialprüfung* in Germany.

the basis of contracts, and this enables States to reduce their own costs.

### The link with the work of the UN Group of Experts on ammunition

In its report to the UN Secretary-General concerning States' views on ammunition stockpiles<sup>17</sup>, Serbia stressed that it had adopted the global and harmonised system for the transport of dangerous goods, in agreement with the UN Committee of Experts, in order to improve the management of conventional ammunition stocks. The report of the Group of Experts<sup>18</sup> on ammunition, in paragraph 35 of section H, refers to the Model Regulation of the abovementioned Committee of Experts on the Transport of Dangerous Goods. Thus, after more than ten years of pushing by civil society<sup>19</sup>, the international community has finally got round to recognising the importance of using a mechanism that already exists within the framework of the UN. The recent OSCE best practice handbook on ammunition<sup>20</sup> serves to confirm this recognition by devoting two long chapters to it – one on the physical securisation of ammunition stockpiles and the other on their transport, in line with the recommendations in the Model Regulations of the Committee of Experts on the Transport of Dangerous Goods.

The future technical guide to be elaborated at the UN level should include, amongst other things, the marking of ammunition as laid down, for example, in the Brazilian legislation described above, as well as the mechanism used for the transport of dangerous goods. It should provide that States' stockpiles are to be managed by specialised teams, who would be responsible for the movement of ammunition and would regularly make inventories and conduct strict checks on their use.

### Need for preventive measures

The management of conventional ammunition stockpiles ought to encompass preventive and proactive measures in the case of suspected diversion. A sanitised, well-controlled ammunition circuit should be capable of avoiding the “preventive wars” to which certain States seem to resort with the aim of going in and searching for the arms and ammunition which they believe to be in the hands of certain non-State actors. This was the case for the Lebanon war in August 2006 and the one in Gaza in January 2009, between Israel and, respectively, Hezbollah and Hamas, concerning the rockets and missiles in the possession of the latter. Ironically, the States that seem most affected by the consequences of the non-regulation of ammunition are those most fiercely opposed to any international controls when control measures are being negotiated at the UN<sup>21</sup>.

17. UN document A/62/166, 27 July 2007, p.18-19.

18. UN document A/63/182, 28 July 2008. See also Annex I to the same report.

19. See, for example, the many GRIP publications on this topic, such as *Le transport des matières dangereuses: un exemple concret de traçabilité*, Analysis Note by I. Berkol and C. Gramizzi, 15 June 2004, at <http://www.grip.org/bdg/g4542.htm>

20. Decision No. 6/08 of the OSCE, *OSCE Handbook of Best Practices on Conventional Ammunition*, Chapters III and IV, September 2008.

21. Chiefly Israel, Egypt, the United States, Iran, Pakistan, India, Russia, China and Cuba: see the GRIP Analysis Note on the the International Instrument on the traceability of SALW, *op. cit.*, - in particular the paragraphs on the “importance of ammunition” and “illicit SALW”.

## 5. Latest technological innovations

International legislation may be lagging, but the same does not go for technology. Innovations, notably micro-stamping and laser marking, now enable manufacturers to insert, right from the time of manufacture, all the information needed to organise the marking and registration of ammunition.

### *Micro-stamping in the State of California*

On 13 October 2007, Arnold Schwarzenegger, the Governor of the State of California, adopted the *Gun Identification Act of 2007 (AB1471)*, a law on the identification of weapons used during criminal acts. However, this law applies only to handguns.

The technique of micro-stamping ammunition entails the use of laser technology to engrave a microscopic marking onto the tip of the firing-pin and the breech of the firearm. When a round is fired, these etchings are transferred to the primer of the cartridge by the firing-pin, through the pressure created when a bullet is fired.

The microscopic marks imprinted on the cartridges can then be analysed by the police and ballistics experts to gain the information needed in order to identify the firearm.

As of 1 January 2010, the manufacturers of semi-automatic pistols sold in California will be required to micro-stamp data about the series of handguns concerned onto the surface of some of their guns.



The primer has been stamped by the firing-pin.

Photo: NationMaster Encyclopedia

### *EDB laser marking*

The Belgian company EDB Engineering<sup>22</sup>, located in the Walloon Region and more specifically in Louveigné-Sprimont, has developed a process for laser-marking ammunition. This technology is regarded as revolutionary for the efficient traceability of ammunition. The innovative technique was developed at the request of the firm's main client, CBC - COMPANHIA BRASILEIRA DE CARTUCHOS<sup>23</sup>. The laser technology itself is not revolutionary, but its application to the armaments industry is a first, much demanded by the main proponents of effective ammunition marking.

Now, instead of marking empty cartridges before assembly, CBC, thanks to the EDB laser technology, can apply a marking after assembly, just before the cartridges are packaged and delivered to the customer. Such a procedure would be impossible with the stamping technique.

By developing this process for one of the world's leading ammunition manufacturers, EDB has proved that, technically, the identification of each piece of ammunition is a feasible operation, which does not have to lead to longer production times or excessive additional costs for the manufacturer (the price of a laser head is put at €70,000<sup>24</sup>).

Technically and financially, this laser process provides very good results, so it seems that the only thing lacking is the political will to generalise this procedure and extend it to all the ammunition production lines.

22. [www.edb.be](http://www.edb.be)

23. CBC is one of the world's most important manufacturers of civil and military ammunition. Based in São Paulo, this firm, which was founded in 1926, today employs 1,230 people. A partner of the Remington up to 1979, CBC is currently a company with exclusively Brazilian capital.

24. In industrial terms, this is not a major sum, compared to the considerable turnover and profits generated by the armaments industry. Moreover, the firm will be able to write off the depreciation on the equipment over time.



## The EDB Engineering laser marking process

### The background...

In December 2003, Brazil adopted a new law (No. 10.826/03) on the tracing of ammunition. It lays down that all ammunition sold must include an identifier of the production lot and the purchaser on the casing of the cartridge (Art.23 §2). It also stipulates that all commercialised ammunition – imported or exported – in the country must be packed in boxes bearing a barcode that identifies the manufacturer.

The Decree regulating the marking of ammunition and its packaging (December 2004) lends even greater precision to the law and stipulates that the information on the packaging must also include the name of the purchaser, the product and the manufacturing number.

This Decree also makes it obligatory for manufacturers and importers to provide inputs for a database that will enable the materiel to be traced. The data required are the name of the purchaser, the type and description of the ammunition, the date of manufacture and the transfer permit number. Recording of these data is obligatory for a period of 10 years. The data are then officially and definitively transferred to the electronic register kept by the national authorities.

Following this decree, the CBC Company had to adapt its production lines, so it asked the Belgian company EDB to develop a laser marking system.

### The process...

EDB develops computerised laser heads that can be installed on existing or new cartridge production equipment. These laser heads engrave individual identifiers that have previously been encoded in the production computer.



source: CBC



source: CBC

The marking of a cartridge by CBC consists of two steps:

- a first marking is carried out by stamping on the rim of the cartridge case. This stage takes place during the initial manufacturing phase, when the cartridge cases are being made and before the insertion of the primer. In other words, this is the same system as is used by other major ammunition manufacturers, such as FN Herstal. So this marking is done with a mould that is regularly replaced (on average, wear and tear make replacement necessary after every 150,000 imprints) and which contains only a limited information set (year of manufacture, identification of the manufacturer and the production lot number), as the future recipient of the ammunition is generally not known at this stage in the production process.

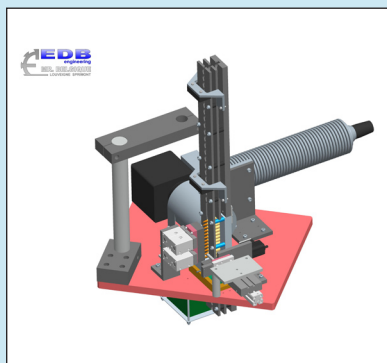


photo: CBC

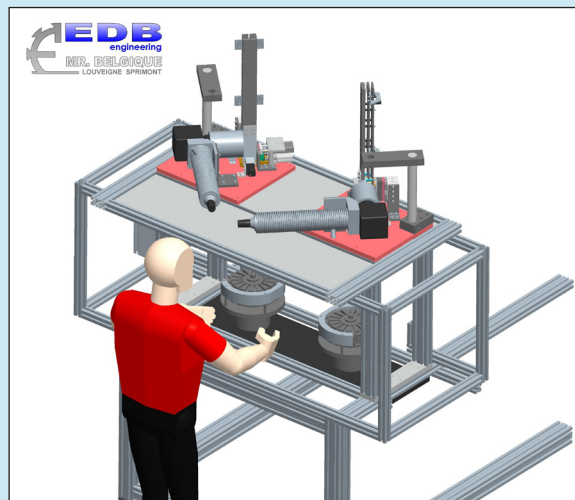


photos: CBC

- the second stage of marking occurs just before the ammunition is packaged and is performed with a laser head. The inscription (year of manufacture, manufacturer, lot number, but also the ammunition's unique identifier and the identification of the recipient of the ammunition) is placed in the extractor groove on the cartridge. This solution offers a twofold advantage: firstly, the groove is the only place where the cartridge is solid metal, contrary to the walls of the cartridge, in which the metal is very thin. So the information can be inscribed deeply enough to prevent erasure. Secondly, the marking in the groove is not subject to any friction at the moment when the bullet exits (no friction between the case and the barrel of the weapon), so guaranteeing the complete preservation of the information marked.



source: EDB



source: EDB

The new cartridge-making machines equipped with two laser heads can inscribe 240 cartridges per minute. The cartridges go down the production line in lots of 10, which are marked simultaneously. The time taken by marking is estimated to be one-tenth of a second.

CBC then proceeds to mark the packaging with a barcode identifying the manufacturer, the purchaser, the characteristics of the ammunition and the production lot number.



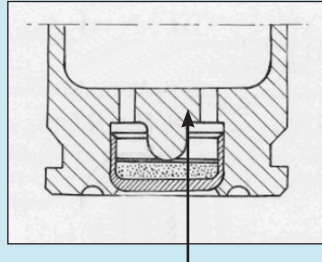
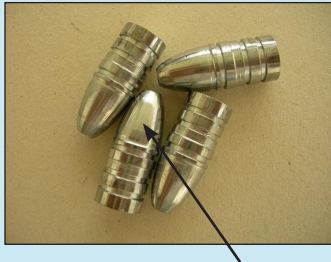
photo: CBC



photo: CBC

### Possible developments...

EDB believes there are no technical limits to the laser process, and there is still room for further progress. So in future, an inscription could be envisaged on the upper cone of the bullet itself, or hidden at the bottom of the primer.



With these developments – the identical marking of the projectile and of the cartridge – the traceability of ammunition will reach a level never before achieved.

The Walloon technology which is today already recognised by one of the world's main ammunition manufacturers – CBC – is likely to achieve a wider international spread if legislations evolve in the direction of standardised, obligatory marking norms.

Tomorrow, if the European Union legislated on the traceability of ammunition as it already does for other products, there can be no doubt that the EDB laser process would be sought by many official ammunition manufacturers.

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## Conclusions

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*“We cannot tolerate a situation in which it is easier to track a genetically modified tomato or a suitcase than an AK47 assault rifle or a rocket launcher. A bag lost somewhere between San Francisco and Sierra Leone can be located within hours, but deadly weapons disappear every day without trace.”* So said Caroline Maurel of the association *Agir ici* in January 2005, at the United Nations conference on marking and tracing.

Three years later, in 2008, neither the regional and international agreements nor the legal instruments deal with ammunition issues separately from the question of SALW, even though the specialised NGOs and the States most active in this field (notably Brazil and Germany) insistently point out the need to do so. Yet improving controls on ammunition would greatly help to identify cases of illicit delivery or stockpiling, as well as the smuggling networks.

Due to the absence of a legally binding international traceability instrument that includes ammunition, exporting countries cannot currently be held responsible when their arms or ammunition

get into the hands of human rights violators and war criminals.

Prevention – that is, effective marking to ensure effective follow-up – should be the basic principle here. Sadly, common sense is not the favourite counsellor of many States which fear having to account for themselves in front of international jurisdictions.

The progress of the International Tracing Instrument should be watched closely, so that States develop it into a tool that should certainly be binding but which must, above all, be operational – i.e. it must encompass the 3 key phases of the process: marking, recording of the data, and a tracing mechanism based on willing international cooperation. These three steps form the basis of the International Instrument for the traceability of SALW and underpin its effective implementation.

But another, less technical, battle remains to be fought. It is all about changing political habits. By agreeing to abide by the regional and international instruments already in force, States would be sending a strong signal to the international arms lobby. That sign is awaited, albeit posthumously, by the millions of innocent victims of firearms worldwide.