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The growing and multifaceted global threat of privately made and other non-industrial small arms and light weapons

Working paper

Submitted by the Small Arms Survey, Instituto Sou da Paz, and the United Nations Institute for Disarmament Research (UNIDIR)

Summary

On the eve of the Fourth Review Conference (RevCon4) of the Programme of Action (PoA) and International Tracing Instrument (ITI), the proliferation and diversion of privately made^a and other non-industrial small arms and light weapons pose a growing threat to security. Recent research by the Small Arms Survey,^b Instituto Sou da Paz, and the United Nations Institute for Disarmament Research (UNIDIR) demonstrates how various forms of non-industrial weapons are used in crime and conflict across the world. Some regions have attempted to regulate rather than prohibit the artisanal manufacture of small arms, but these efforts are hindered by implementation challenges and the diversion of some craft-produced firearms. Meanwhile, new technological developments and the ease with which information and expertise can be shared online have decentralized production, contributing to the global diffusion of the tools and skills necessary to build small arms and light weapons. Additionally, trafficking in small arms components, readily convertible blank-firing alarm weapons, and devices that convert semi-automatic pistols and rifles into automatic weapons (conversion devices) provide criminal and conflict actors with diverse ways to illicitly assemble, produce, and convert a range of small arms and light weapons. As a result, across regions, non-industrial weapons no longer represent only marginal fractions of seized small arms and light weapons. Rather, the problem appears to be growing in scale and complexity, and it is important for UN member state delegations at RevCon4 to understand this complexity as they deliberate the Conference's outcome document, and set the mandate for the Open-ended Technical Expert Group (OETEG).

^a In this paper, the term 'privately made' is used interchangeably with 'craft', and is intended to capture the full range of non-industrial production techniques used today.

^b The Small Arms Survey is an associated programme of the Fondation pour l'étude des relations internationales et du développement in Geneva, Switzerland.

Terminology and typologies

This paper broadly examines privately made and other non-industrial small arms and light weapons and their components—defined here as weapons produced outside a licensed industrial factory. The weapons under review also include small arms assembled in part with industrially made components. As most types of privately made small arms do not include serial numbers and are therefore difficult to trace—at least through conventional methods—they are also often referred to as ‘ghost guns’. It should be noted that not all non-industrial weapons are necessarily produced illicitly. Indeed, some countries and regions allow such production to take place under certain conditions, as will be discussed further below.

Recent research shows that a wide variety of non-industrially produced small arms and light weapons have been seized, or used in criminal and terrorist acts, as well as in conflict settings, across several regions in recent years. They include:

- rudimentary artisanal small arms;
- craft-produced semi-automatic and automatic weapons and counterfeits;
- converted ‘blank-firing’ alarm handguns, and ‘retro-converted’ deactivated, ‘acoustic expansion,’ and ‘Flobert’ weapons;
- small arms assembled from industrially made components (including ‘partially finished’ or ‘80 per cent’ receivers);
- small arms converted to automatic fire through the use of conversion devices; and
- small arms and components fabricated through the use of 3D-printing and computer numerical control (CNC) milling technology.

Developments regarding the non-industrial production of small arms and light weapons ammunition are provided as additional background in Box 1.

This list illustrates the wide range of small arms and light weapons and their components being produced outside of licensed factories. Based on regional and country studies undertaken by the Small Arms Survey and Instituto Sou da Paz, as well as a forthcoming UNIDIR report that draws on state responses to a survey dedicated to the issue of craft small arms,^c this working paper provides evidence that non-industrial manufacturing techniques are being used across all regions of the world. The global diffusion of non-industrially produced small arms represents a challenge for the UN PoA and ITI and other international arms control frameworks, as the authorized industry has generally been the primary focus of efforts to regulate the sector and prevent the diversion of small arms at the manufacturing phase of the weapon’s life cycle. This working paper is an initial effort to contribute to a broader understanding of the issue and promote common understandings of its scope and various manifestations, in order to better measure the scale of the problem and identify possible solutions.

^c The UNIDIR report ‘Unregulated Production: Examining Craft-produced Weapons from a Global Perspective’ will be released at the Fourth Review Conference (RevCon4) side event ‘New and Emerging Developments in Craft-produced Small Arms and Light Weapons: Regional Perspectives’, co-organized by France and UNIDIR, to be held in room CR9 on 20 June 2024.

A global and multifaceted phenomenon

Non-industrial production of small arms and light weapons and their components affects every region of the world. Out of the 80 UN member states that responded to the UNIDIR survey, 58 indicated that craft-produced small arms were being used or produced in their country.¹ As the illustrative overview of recent cases below showcases, non-industrial small arms are not only proliferating globally and across regions, but also increasing in sophistication and reliability.

- *Rudimentary single-shot artisanal small arms*

This category refers to single-shot small arms fabricated largely by hand and in relatively small quantities. Such production generally relies primarily on locally available materials and tools of an unspecialized nature. In spite of their rudimentary nature, these weapons have been used in crime as well as in high profile attacks—such as the assassination of former Japanese Prime Minister Shinzo Abe in 2022.² States in Africa, Latin America, and the Caribbean, as well as in the Asia-Pacific region, reported such production through the UNIDIR survey.³ Traditional production of shotguns and hunting rifles, for instance, has been documented in all member states of the Economic Community of West African States.⁴ Other examples include seized artisanal shotguns and flare guns illicitly converted to fire pistol ammunition, as seen in the Caribbean.⁵

- *Craft-produced semi-automatic and automatic weapons and counterfeits*

This second category includes small arms with semi-automatic and automatic fire capability. Craft-produced semi-automatic pistols tend to be produced in workshops and to involve more specialized equipment and skilled individuals. States in Africa, Latin America, and the Caribbean reported such manufacture.⁶ These weapons were documented in West Africa⁷ as well as in Brazil,⁸ for instance, illustrating the increasing capabilities of non-industrial firearms being produced in these regions. Weapons that closely replicate real models and carry fake markings of real manufacturers are commonly referred to as counterfeits, and have become an emerging problem in Europe.⁹

- *Converted ‘blank-firing’ alarm handguns, and ‘retro-converted’ deactivated, ‘acoustic expansion,’ and ‘Flobert’ weapons*

The conversion of small arms can involve transforming alarm ‘blank-firing’^d and ‘traumatic’^e weapons into fully functioning small arms capable of expelling lethal projectiles. Other documented methods have included modifying deactivated firearms, acoustic expansion weapons, and Flobert-calibre small arms to (re-)enable them to fire lethal ammunition.¹⁰ States in Western Europe, Eastern Europe, Latin America, the Caribbean, and Africa reported cases of small arms that were illicitly converted or reactivated.¹¹ Converted small arms remain a key source of illicit weapons in Europe, and notably in the Netherlands, where the police estimate that about 40 per cent of the 5,000 firearms it seizes annually are converted or modified firearms.¹² Converted blank-firing alarm handguns have also been seized in other regions, including in Africa, the Middle East, and the Caribbean.¹³

- *Small arms assembled from industrially made components (including ‘partially finished’ or ‘80 per cent’ receivers)*

These weapons are assembled using industrially made parts and components that are trafficked or acquired illicitly. States in Latin America, the Caribbean, Western Europe, and, to a lesser extent,

^d ‘Blank-firing’ weapons are those originally designed to fire blank ammunition only, meaning cartridges that do not contain a projectile.

^e ‘Traumatic’ weapons are those originally designed to expel rubber projectiles only.

Eastern Europe reported the assembly of small arms using industrially made components.¹⁴ The parts used in these weapons can also include partially finished pistol frames and rifle receivers—sometimes referred to as ‘80 per cent’ receivers—and kits that can be finished and assembled with non-specialized tools. Many of the privately made small arms seized in the United States in recent years—the number of which jumped from 1,758 firearms in 2016 to 19,344 in 2021—appear to fall into this subcategory.¹⁵ In Rio de Janeiro, Brazil, the local police reported seizing at least 38 semi- and fully automatic rifles produced using 80 per cent lower receivers from local criminals between January and November 2017.¹⁶ Seizures of small arms made with partially finished receivers have also taken place in the Caribbean and Europe.¹⁷

- *Small arms and components fabricated through the use of 3D-printing and CNC milling technology*

This category includes small arms and components fabricated through the use of 3D-printing or CNC milling technologies. This commercially available equipment enables the user to produce custom-designed objects with plastic/polymer (for 3D printers) and metal (for CNC milling machines). The UNIDIR survey reveals that the use of 3D-printing and CNC milling technologies to manufacture small arms is growing in Western Europe, as well as in Latin America and the Caribbean, but no such cases were reported by African countries.¹⁸

The cost of 3D printers has decreased in recent years, while the quality and reliability of designs for 3D-printed small arms has improved, including increasingly reliable semi-automatic models. Authorities have therefore seized growing numbers of illicitly produced, held, or used 3D-printed firearms in several regions across the globe. North America and Europe have recorded the most cases to date.¹⁹ In Quebec, Canada, 3D-printed firearms represented as much as 14 per cent of all seized firearms examined by its forensic laboratory in 2023, compared with only one per cent per year between 2016 and 2022.^f Caribbean authorities reported the first seizures of 3D-printed small arms and 3D-printing workshops in the region in 2023,^g and in Brazil an ‘FGC’ model was seized from a neo-Nazi cell in 2022 in the southern state of Santa Catarina.²⁰

CNC milling machines remain more expensive than 3D printers, and there have been fewer reported cases of their use to illicitly produce small arms and their parts. That said, some countries have documented the use of these machines to produce firearm components that are then trafficked. Authorities in the Caribbean, for instance, seized several dozen CNC-milled lower receivers for AR-15-pattern rifles in 2023.²¹

- *Small arms converted to automatic fire through the use of conversion devices*

Conversion devices are simple and easy-to-install accessories that convert semi-automatic handguns and rifles into fully automatic weapons. The proliferation of shooting incidents involving these devices in parts of the United States led the city of Chicago to file a complaint against a firearm manufacturer over the convertibility of its handguns through the use of these accessories.²² Conversion devices have also been seized or used in other regions, such as the Caribbean, South America, and Europe, including in combination with small arms assembled from 80 per cent frames.²³

^f Written correspondence with the ballistics department of the Laboratoire de sciences judiciaires et de médecine légale du Québec, June 2024.

^g These developments are documented in ‘[Dangerous Devices: Privately Made Firearms in the Caribbean](#)’, a forthcoming Situation Update to be launched at the RevCon4 side event ‘[A Public Health Crisis: Firearms Trafficking and Violence in the Caribbean](#)’—co-organized by the Bahamas and the Small Arms Survey—to be held in room CR11 on 18 June 2024 at 13:15 (ET).

Box 1: Non-industrial production of small arms and light weapons ammunition

Although less researched, craft production of small arms and light weapons ammunition is also taking place across regions. This box provides background on homemade and reloaded small arms ammunition, as well as on craft-produced light weapons and their ammunition, including certain types of improvised explosive devices (IEDs). The challenges posed by these trends can be addressed by multilateral processes and instruments, such as the Global Framework for Through-life Conventional Ammunition Management and United Nations General Assembly Resolutions on Countering the Threat Posed by Improvised Explosive Devices.^h

- *Homemade and reloaded small arms ammunition*

Private producers of small arms tend to tailor the calibre of their products for use with locally available industrially made ammunition. There are exceptions, however. These include the production of improvised ammunition for use with certain crude single-shot artisanal weapons, as well as the modification of blank cartridges for use in converted alarm handguns by adding projectiles to initially blank cartridges. Other known practices include the reloading of spent cartridges, and the self-loading of commercially available empty cartridge casings.²⁴ Some individuals are also actively developing 3D-printed ammunition fabrication processes.²⁵ While research to date on the scale of trafficking in and unauthorised use of privately made ammunition is very limited due to the scarcity of data, recent regional studies have documented some cases of misuse. In Europe, for instance, spent ammunition casings produced by companies that specialize in empty cartridges for self-loading have been recovered at crime scenes.²⁶ Likewise, self-loaded cartridges have been used in violent crime in the Caribbean, where authorities have also seized ammunition primers and loading equipment.¹

- *Craft-produced light weapons and their ammunition, including certain types of IEDs*

Research has documented the non-industrial production of a range of light weapons and associated ammunition, including grenade launchers and rifle grenades, recoilless guns, mortars, and rocket launchers. These weapons have been produced or used by armed groups in various regions and areas, including the Middle East, North Africa, Latin America, Chechnya, and Northern Ireland.²⁷ These non-industrial light weapons may be considered as certain types of IEDs depending on their technical characteristics.^j A range of IEDs—including victim-operated IEDs—have allowed armed groups to destabilize states, and to kill and wound defence and security forces, peacekeepers, and civilians in various regions, including in West Africa and the Sahel.²⁸ The use of IEDs is not limited to conflict areas, however. In some European states, the use of IEDs and pyrotechnics to attack ‘ATMs, refugee shelters, other criminal groups, law enforcement officials, and firefighters, among other targets,’ is a growing concern.²⁹ The same is observed in the Brazilian state of Rio de Janeiro, where artisanal grenades and other types of IEDs are becoming an increasing problem. Out of 9,355 explosive artifacts seized in the state of Rio de Janeiro between 2012 and 2019, 23 per cent were artisanal.³⁰ Finally, both rebel groups and criminal organizations in South-east Asia have also been using IEDs to advance their goals.^k

^h See ‘[Global Framework for Through-life Conventional Ammunition Management](#),’ UN General Assembly; and ‘[Improvised Explosive Devices \(IEDs\)](#),’ UN Office for Disarmament Affairs.

ⁱ ‘[Weapons Compass: The Caribbean Firearms Study](#),’ p. 124. The identified cases of self-loaded ammunition probably represent the tip of the iceberg of the criminal use of homemade ammunition, as the imagery that researchers could access in both the Caribbean and Europe did not make it possible to detect instances of reloaded ammunition.

^j For example, craft-produced light weapons that involve a launched explosive charge are typically considered projected IEDs, whereas improvised landmines can be considered victim-operated IEDs. These types of IEDs therefore arguably fall within the list of small arms and light weapons elaborated in the 1997 ‘[Report of the Panel of Governmental Experts on Small Arms](#).’

^k In this region, as new technologies and materials come to the market, the components used in the production of IEDs have evolved. This has been seen in the evolving design of detonators, triggering devices, and, more

Implications: a variety of enduring and emerging trends

New technological developments, along with the ease of access to information and knowledge online, has accelerated the spread of non-industrial small arms and light weapons. As the above overview suggests, however, a range of other enduring and emerging trends are also at play and involve different techniques and actors across regions. Some of these issues should be examined as part of the proposed OETEG on developments in small arms and light weapons manufacture, technology, and design. The non-paper on ‘The Craft Manufacturing of Small Arms and Light Weapons’ also contains a number of relevant and practical recommendations for states to address these issues.¹ Below is a summary of policy implications as observed by the submitting institutions, with a view to supporting efforts to address private and non-industrial small arms production in a comprehensive manner.

- *The need to recognize the growing and multifaceted security threat posed by privately made and other non-industrial weapons*

The range of options for producing small arms outside of licensed factories has increased, and their use in crime and conflict is no longer marginal in certain settings. Moreover, increasingly reliable models are being developed, including with semi-automatic and fully automatic capabilities. This has not only narrowed the gap with industrial weapons, but also contributed to growing concerns over potential impacts on public safety and health.³¹ Recognizing the diversity and complexity of these rapidly evolving trends is a prerequisite for identifying appropriate responses. The Third Review Conference (RevCon3) outcome document acknowledged several types of privately made small arms, including the illicit reactivation and conversion of small arms and light weapons (p.14). RevCon4 delegates should likewise ensure that both ongoing challenges and emerging trends are similarly recognized in this year’s outcome document.

- *The need for a shared understanding on the scope and different facets of non-industrial production*

The lack of a common understanding of what constitutes non-industrially produced small arms represents a significant challenge for regulation and efforts to counter illicit production and trafficking. Recognizing the variety of non-industrial manufacturing techniques as part of a larger, global phenomenon is fundamental to addressing this transnational challenge. To reach such agreement, it is vital to make the most out of existing international and regional forums for dialogue and cooperation. In this sense, efforts by law enforcement to inform such discussions, providing technical and up-to-date information to states and regional organizations, are highly valuable.

- *The inadequacy of existing regulations on the manufacture of small arms*

Existing international regulations on small arms manufacture were developed more than two decades ago, at a time when privately made weapons were a more marginal and less complex issue. The UN PoA primarily distinguishes between licensed and illicit/illegal manufacture (paras. I.2; II.2), but makes

recently, the use of anti-lift/anti-handling mechanisms. Information based on joint UNIDIR and Non-Violence International Southeast Asia research in South-east Asia.

¹ These recommendations were discussed at the February 2024 RevCon4 Preparatory Committee (PrepCom) side event ‘[Unregulated: A Discussion on the Global Proliferation of Craft-Produced Weapons](#)’, co-organized by France and UNIDIR.

no specific references to artisanal and other forms of non-industrial production.^m Moreover, regions that have attempted to regulate rather than prohibit craft production continue to face challenges in implementing the relevant PoA commitments and regional obligations, such as the registration of producers and the marking of small arms, which were generally conceived for industrial actors.³² The question then arises as to whether more tailored and detailed guidance should be provided to states to prevent both the illicit manufacture and diversion of non-industrially produced small arms and light weapons and their components.

- *The need for information sharing and international cooperation and assistance*

Privately made small arms not only pose challenges to manufacturing controls, but also threaten the international arms control architecture. As the reliability of these weapons improves over time, they may become increasingly viable options for criminals, terrorist-designated organizations, and armed groups, who will no longer seek to illicitly acquire industrially produced weapons. Preventing illicit acquisition from these (conventional) sources has been one of the primary focuses of international small arms controls, tracing, and investigations, but these measures may be rendered increasingly irrelevant if demand can be met by non-industrial production capabilities. The regular sharing of information and lessons learned by affected states,ⁿ and pooled investments for improving methods for the detection, tracing (for instance, through forensic techniques),³³ and investigation of non-industrial and privately made small arms are therefore crucial next steps for the international community. Additionally, the improvement of existing legislative frameworks requires disaggregated, up-to-date, and centralized seizure databases that are able to capture adequate information on the full range of privately made small arms.

- *The need to understand demand and the legitimate cultural and socio-economic dimensions that sometimes underpin non-industrial production*

Supply-side controls on non-industrial small arms manufacture are unlikely to be effective in the long term without considering and addressing, in parallel, the underlying demand for privately made small arms. Indeed, early efforts to prohibit craft production in West Africa were found to be challenging to monitor and enforce, and risked pushing producers further underground, especially in places where arms manufacture was rooted in cultural traditions and part of communities' socio-economic fabric.³⁴ More studies are needed to understand the motivations of individuals and groups resorting to private and non-industrial production in order to design comprehensive initiatives that can provide them with alternative and non-violent ways of achieving their goals.

Conclusion

Globalization, modernization, and the development of new technologies have allowed serviceable small arms to be produced by an increasingly large population of potential illicit end users. These new technologies have also decentralized the field of weapon production far beyond what is regulated by existing instruments, making production accessible to a potentially unlimited audience. In the absence of a comprehensive and coordinated response, certain emerging types of non-industrial small arms risk being overlooked, and the underlying root factors of demand and supply ignored.

^m For an overview of manufacture-related provisions of relevant regulatory frameworks in West Africa, see '[Between Tradition and the Law: Artisanal Firearm Production in West Africa](#),' pp. 9–12 and '[Annexe 2: Manufacture-related provisions of relevant instruments](#),' pp. 3–4.

ⁿ This could be achieved, for instance, through the use of existing information-sharing mechanisms at the international (e.g. the INTERPOL Illicit Arms Records and tracing Management System—iARMS) and regional levels.

RevCon4 presents an important opportunity to address the diverse challenges posed by privately made and other non-industrial small arms and light weapons in a growing number of regions. It is clear that this phenomenon is properly integrated under the PoA's focus on the illicit trade 'in all its aspects' as well as in PoA Section II(2) that commits states to 'exercise effective control over the production of small arms and light weapons within their areas of jurisdiction and over the export, import, transit or retransfer of such weapons, in order to prevent illegal manufacture of and illicit trafficking in small arms and light weapons, or their diversion to unauthorized recipients.' The challenges that these types of weapons pose for the effective marking and tracing requirements set out in the ITI should also be evident. To the extent that technical expertise is needed to understand and address the challenges outlined in this paper, privately made and other non-industrial small arms and light weapons could also be important subjects for the projected OETEG to consider.

RevCon4 also offers the chance to encourage states to increase information sharing on the non-industrial weapons in circulation and to cooperate with one another and exchange good practices on the most effective methods of controlling the production, ownership, sale, and export of these weapons, and of detecting and investigating the illicit production and trafficking of them. To meet these objectives, traditional arms control actors will need to extend their cooperation with actors from other relevant domains such as postal services and technology firms, including those actors governing the surface web.⁹ Promoting a global and multi-stakeholder dialogue on the issue is key to addressing the challenges posed by illicit non-industrial production, and to fighting illicit trafficking in small arms more generally.

⁹ This case in Brazil, for example, led to the removal of thousands of online tutorial videos for the private manufacture of firearms: '[Polícia descobre fábricas clandestinas de armas caseiras em onze estados,](#)' 2024, Veja.

Sources

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- ²⁶ [‘Monitoring Illicit Ammunition through the Ballistic Datasets of Four European Countries,’](#) 2022, André Desmarais et al., Forensic Science International, pp. 12–13.
- ²⁷ [‘Beyond State Control: Improvised and Craft-produced Small Arms and Light Weapons,’](#) pp. 91–108.
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- ²⁹ [‘Illicit Firearms Ammunition and Other Explosive Munitions in the European Union,’](#) 2023, Small Arms Survey and Flemish Peace Institute, p. 16.
- ³⁰ [‘Panorama das apreensões de armas de fogo e artefatos explosivos no estado do Rio de Janeiro em 2019,’](#) 2020, Instituto de Segurança Pública, pp. 18–19.
- ³¹ [‘Dangerous Devices: Privately Made Firearms in the Caribbean.’](#)
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- ³³ See, for instance, [‘Was a 3D-printed Firearm Discharged? Study of Traces Produced by the Use of Six Fully 3D-printed Firearms,’](#) 2023, Szwed et al., Forensic Science International.
- ³⁴ [‘Between Tradition and the Law: Artisanal Firearm Production in West Africa,’](#) pp. 10, 12.