

# PROJECT INSIGHT

## Privately Made Firearms in the European Union

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### KEY FINDINGS

- Converted firearms are the most prominent type of privately made firearms (PMFs) currently circulating in the European Union (EU). The European Commission has adopted measures to address regulatory loopholes in recent years, but their impact will take time to be felt given delays in implementation in some member states, and the substantial numbers of readily convertible weapons already in circulation.
- 3D-printed firearms, ghost guns, and counterfeit firearms represent emerging but concrete threats, as illustrated by recent seizures of these types of weapons. The regulatory challenges posed by 3D-printed firearms are particularly significant.
- The lack of standardization and granularity in official seizure data currently hinders a comprehensive analysis and monitoring of the use of PMFs in crime and violence. As PMFs may constitute a growing proportion of seized and crime firearms in the future, providing law enforcement officers and journalists with the necessary knowledge and skills to detect and report on PMFs will be critical to tackling this threat.

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## Abbreviations

EC	European Commission
EU	European Union
NFI	Netherlands Forensic Institute
PMF	Privately made firearm

## Introduction

Improvements in technology and information sharing have transformed PMFs from crude, impractical homemade devices of limited value to most criminals into highly functional weapons that are increasingly viewed as viable substitutes for factory-built firearms, including converted firearms, ghost guns, and 3D printed weapons (see the section below for definitions). Globally, PMFs still represent a small percentage of illicit firearms,<sup>a</sup> but that is changing quickly in some regions. If production technologies continue to improve and proliferate, PMFs will increasingly erode the effectiveness of export controls and other key elements of national and international small arms control regimes, and may eventually pose an existential threat to these regimes. Emerging threats such as 3D-printed firearms pose new challenges since they allow individuals and criminal groups to assemble or produce increasingly reliable firearms entirely from inexpensive and readily available components and equipment. The lack of serial numbers on such weapons also complicates tracing efforts, which have been a cornerstone of investigations into the trafficking of industrially made firearms. Policy-makers need detailed, nuanced information on PMFs to respond proactively to this threat. This paper provides information on the illicit proliferation of PMFs, parts, and accessories currently circulating in Europe, and identifies other types of PMFs and PMF production technologies that may become more commonplace over the next three to five years.

<sup>a</sup> In this paper, the term “firearms” refers to weapons belonging to the following categories only: revolvers and self-loading pistols; rifles and carbines; shotguns; sub-machine guns; and light, medium, and heavy machine guns. The terms “arms and ammunition” and “weapons” are used interchangeably and refer to firearms and their ammunition, parts, and accessories. The term “accessory” refers to an item that physically attaches to a weapon and increases its effectiveness or usefulness but, generally speaking, is not essential for the basic intended use of the weapon. See Grzybowski, J., Marsh, N. & Schroeder, M (2012), Piece by piece: Authorized transfers of parts and accessories, in: Small Arms Survey, *Small Arms Survey 2012: Moving targets*, Cambridge: Cambridge University Press, p. 245, <https://www.smallarmssurvey.org/resource/small-arms-survey-2012-moving-targets>. The term “illicit” refers to weapons and ammunition that are held, modified, produced, transferred, or used in violation of national or international law. The paper uses the term “illicit” rather than “illegal” to account for cases of unclear or contested legality. “Trafficking” and “smuggling” are also used interchangeably and refer to the illicit transfer of firearms within or across national borders, usually involving a change in ownership. See Schroeder, M. (2014), On the record: Illicit weapons in the United States, in: Small Arms Survey, *Small Arms Survey 2014: Women and guns*, Cambridge: Cambridge University Press, p. 246, <https://www.smallarmssurvey.org/resource/small-arms-survey-2014-women-and-guns>.

The paper draws on data from two main sources: (1) interviews and written correspondence with law enforcement officials and other subject matter experts—including, in some cases, official data and information on seized firearms provided to the Small Arms Survey and other Project INSIGHT partners; and (2) data on PMFs seized and used in incidents as recorded by the Gunviolence.eu – Incident Monitor (hereafter referred to as the “Incident Monitor”) of media reporting.<sup>a</sup> Data from these sources was cross-checked against—and supplemented with—information from academic literature and expert reports.

The paper begins with a discussion of key terms and definitions, before providing a general overview of the issue of PMFs in the EU. It then examines the different types of PMFs circulating in the region and their origins, with a specific focus on converted firearms, 3D-printed weapons, ghost guns, and other types of PMFs. The paper also reviews prominent cases of illicit end uses and end users of these weapons, before turning to a discussion of the policy implications of the proliferation of PMFs in the EU.

## Terms and definitions

The US government defines a PMF as “a firearm, including a frame or receiver, assembled by a person other than a licensed manufacturer, and not containing a serial number or other identifying marking placed by a licensed manufacturer at the time the firearm was produced”.<sup>1</sup> In the United States, the terms “PMFs” and “ghost guns” tend to be used interchangeably, although “ghost guns” refer more specifically to firearms that are “assembled from partially finished frames

or receivers<sup>b</sup> and factory-built parts—often packaged and sold as kits”.<sup>2</sup>

In the European context, PMFs include—but are not limited to—ghost guns. In fact, they currently mainly include several types of converted firearms (see below), as well as more crude types of homemade firearms and still relatively limited numbers of 3D-printed firearms. 3D-printed firearms include firearms—as well as components of firearms—that are manufactured using a 3D printer.<sup>c</sup> While there is no universally agreed definition of homemade firearms—also commonly referred to as “artisanal” or “craft”—this category generally refers to weapons fabricated largely by hand and in relatively small quantities. They also tend to use simple designs and are easily constructed and made of readily available materials.<sup>3</sup>

“Converted firearms” are another type of PMF defined in this paper as any portable barrelled weapon that was originally incapable of expelling a lethal-purpose projectile, but subsequently modified to be able to do so. Previous research has documented the existence of two broad categories of converted firearms in the European context: (1) non-lethal imitation firearms that are modified to fire lethal projectiles; and (2) real firearms whose firing capabilities were either removed or significantly downgraded before their authorized sale, but whose original capabilities were subsequently reactivated through conversion. The first category includes items such as converted “blank-firing” alarm handguns and airsoft guns. The second category comprises deactivated firearms (real firearms whose essential components have been rendered permanently inoperable), acoustic expansion weapons (real firearms that were transformed into blank-firing weapons before

a The Incident Monitor ([www.gunviolence.eu/incident-monitor](http://www.gunviolence.eu/incident-monitor)) aims to collect media articles on firearm-related violence in all EU member states. It processes data in real time through an automated system that uses artificial intelligence. For more detailed information on the development and functioning of the Monitor, consult the methodological report: Cops, D., De Schutter, A. & De Smedt, T. (2023), *Gunviolence.eu – Incident Monitor: Methodological report*, Brussels: Flemish Peace Institute, <https://vlaamsvredesinstituut.eu/en/project-insight/#methodologicalreport>.

b These items are also commonly referred to as “receiver blanks”, “unfinished receivers”, and “80 per cent receivers”.

c For a historical overview of 3D-printed firearms and emergent craft production technologies, see Hays, G., Ivan T. & Jenzen-Jones, N.R. (2020), *Desktop firearms: Emergent small arms craft production technologies*, Perth: Armament Research Services (ARES), <https://armamentresearch.com/wp-content/uploads/2020/03/ARES-Research-Report-8-Desktop-Firearms.pdf>.

sale), and so-called “Flobert conversions” (real firearms whose calibre was downgraded to Flobert<sup>a</sup> before sale) that were subsequently “retro-converted” to fire lethal projectiles.<sup>4</sup>

## Overview of PMFs in the EU

Although the extent of the proliferation of PMFs is difficult to measure, its reach is global. While the use of the term PMF is relatively recent and originates from the United States, the issue of home-made and improvised firearms is not new and affects various regions across the world, including Europe.<sup>5</sup> In the EU, available seizure data often lacks consistency and the necessary detail to enable longitudinal analysis and cross-national comparisons of PMF proliferation. Indeed, some countries lump PMFs together with other weapons under “other” categories, which limits the utility of aggregate seizure figures. This is the case in France, for instance, where the category of “other firearms” includes shotguns, blanks, firearms shooting rubber bullets, and other types, yet accounts for as much as 19 per cent of the 37,688 weapons seized by the national police between 2016 and 2021.<sup>6</sup> Other countries such as Greece reported specifically on the seizure of 1,643 “gas alarm” firearms between 2018 and 2022, but did not specify whether the seized items were deemed readily convertible, or had already been converted to fire lethal projectiles.<sup>7</sup> Even in countries that attempt to disaggregate statistics to account for

specific types of PMFs, seizures of these weapons tend to be under-reported due to miscategorization. Indeed, many PMFs look very similar to industrially made firearms (or are reactivated firearms of this type), and others are even very close replicas of specific industrial models. As a result, the seizing authorities may mistakenly categorize them as industrial firearms if they lack the necessary expertise and training.<sup>8</sup>

Factory-produced weapons still generally outnumber PMFs in seizure data,<sup>9</sup> but PMFs constitute a rapidly growing threat. In recent years, Europol has documented an increase in seizures of PMFs—or trafficked parts of PMFs—in the EU.<sup>10</sup> In some European countries, PMFs may even potentially constitute the

primary source of illicit firearms, owing notably to the ongoing challenge of converted alarm handguns.<sup>b</sup> Overall, the growing nature of the PMF threat in the European context is consistent with trends observed in some other parts of the world. In recent years in the United States, for instance, PMFs—including “ghost guns” and 3D-printed firearms—have accounted for significant numbers of firearms used in crime: from 2016 to 2021, the “ATF received approximately 45,240 reports of suspected privately made firearms recovered by law enforcement, including in 692 homicide or attempted homicide investigations”.<sup>11</sup> The relatively recent dissemination of 3D-printing technology and the proliferation of parts to produce ghost guns is likely to accelerate this growth.

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a “Flobert firearms were developed in the 19th century for indoor shooting. They do not fire traditional cartridge-based ammunition, but instead shoot percussion caps filled with a small projectile. Today, Flobert firearms are advertised as weapons for target practice.” Extracted from Florquin, N. & King, B. (2018), *From legal to lethal: Converted firearms in Europe*, Geneva: Small Arms Survey, p. 23, <https://www.smallarmssurvey.org/resource/legal-lethal-converted-firearms-europe>.

b Previous research has shown, for instance, that the UK Border Force seized four times as many imitation firearms as real firearms (7,058 versus 1,608) for the period 2010/11 to 2015/16. See Florquin, N. & King, B., *From legal to lethal: Converted firearms in Europe*, p. 34.

Perhaps with the exception of counterfeit weapons, most types of PMFs circulating in Europe have in common that their production can be performed in the geographical and temporal proximity of the illicit end user, especially within the EU given the free movement of people and goods. This characteristic makes the more visible and risky trafficking of completed PMFs across borders unnecessary for illicit end users. As a result, efforts to tackle illicit flows of PMFs cannot rely solely on traditional measures to control international arms transfers and prevent illicit cross-border trafficking of firearms. Methods to investigate and trace these weapons are also hindered by the absence of serial numbers on most types of PMFs,<sup>12</sup> as well as by the challenges of conducting ballistic analyses with these types of weapons.<sup>13</sup> 3D-printed weapons also pose unique challenges for law enforcement in that latest-generation models are made primarily or entirely from printed components and widely available commercial materials.<sup>14</sup> These attributes undermine production and transfer controls and complicate detection and tracing efforts.

## Types of PMFs in the EU

This section reviews the main types of PMFs proliferating in the European context. The conversion of firearms—both from alarm weapons and deactivated or “downgraded” firearms—has represented a key source of illicit weapons on the continent and continues to constitute one of the main challenges. In recent years, 3D-printed firearms and ghost guns—PMFs that are assembled from partially finished pistol frames and rifle

receivers—have also attracted growing levels of concern and represent rapidly emerging threats. The section also provides an overview of other types of PMFs and accessories recently documented in Europe.

## Converted firearms

Converted firearms have proliferated and been used in the EU for more than three decades.<sup>15</sup> Converted alarm weapons, mostly manufactured in Türkiye, continue to be widespread across the EU. These weapons are converted into lethal firing firearms, rebranded to well-known brands, and trafficked online, through parcel services, or through Western Europe to reach the wider European market.<sup>16</sup> In the EU, Belgium, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Romania, Spain, and Sweden have all reported the common use of these weapons in firearm-related crimes.<sup>17a</sup> In April 2023, Operation Conversus, led by Romania and Bulgaria and involving cooperation with a total of 31 countries, resulted in the seizure of 1,492 alarm and signal weapons (both converted and non-converted). Most of these weapons were produced in Türkiye.<sup>b</sup> According to Europol, they “had been imported into the EU and legally offered for sale in Bulgaria and other Member States”, and were then “often trafficked across borders and converted into lethal weapons in other countries within or outside the EU”.<sup>18</sup> The magnitude of such seizures illustrates the continuing challenge posed by converted alarm firearms across Europe.

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- a Turkish-made alarm guns have also proliferated in other European countries such as Kosovo and the United Kingdom, and outside Europe in North America, Africa, and the Middle East. (The designation of Kosovo is without prejudice to positions on status and is in line with UN Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo declaration of independence.)
- b Türkiye has strengthened its regulations on blank-firing and gas firearms, but the effects of these measures will take time to be felt given the quantities of such weapons already circulating. Written correspondence with European law enforcement official, September 2023. Information on the relevant Turkish regulations can be found at <https://www.mevzuat.gov.tr/mevzuat-metin/1.5.5729.pdf> and <https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=34039&mevzuatTur=KurumVeKurulusYonetmeliği&mevzuatTertip=5>.

About 930 articles from 2019 to 2022 in the Incident Monitor—mostly from German, Austrian and Italian newspapers—mentioned the use of alarm weapons. It is unclear if all articles relate to converted or non-converted alarm weapons, as only 20 articles in the Monitor (10 from Italian sources and 10 from Dutch sources) specify that they relate to modified blank-firing pistols.<sup>a</sup> When it comes to airsoft guns, the number of articles (1,847) is twice as high as that of alarm guns and originate mostly from German, Bulgarian, and French sources, in that order. It is also often unclear, however, whether these airsoft guns were converted, as this information was not systematically reported in the media sources. Another interesting category is “replica” firearms, which comprises 708 articles, mainly from Italian, Spanish and French newspapers. Although non-converted imitation firearms can also be used in crime, it seems that the small number of cases above reported as converted (20) could be due to journalists and media outlets’ lack of awareness of the conversion issue—a gap that firearm-related training for journalists could potentially address.

Converted acoustic expansion weapons and Flobert weapons have also been commonly used in criminal cases in the EU. Until recent years, most of these weapons were sourced in Slovakia, from where, taking advantages of loopholes in the legislation, they have been sold legally and then transported across the whole of the EU.<sup>19b</sup> Acoustic expansion weapons were particularly prominent types of converted weapons until 2015, after which Slovakian authorities tightened regulations over

their sales. Flobert weapons became popular among criminal circles thereafter, notably due to the ease with which they could be converted back to their original calibre. According to law enforcement sources, as many as 16,847 firearms were transformed into Flobert-calibre weapons in Slovakia between 2015 and 2022.<sup>20</sup> New legislative changes made in Slovakia in 2022 to conform to the revision of the EU Firearms Directive led to a drop in this rate of production: between February and October 2022, only 91 such weapons were recorded to have been produced.<sup>21</sup>

Determining how many such “reactivated” or “retro-converted” firearms are used in crime is particularly challenging, given that they look like a normal firearm to the untrained eye. Moreover, cartridges fired by such weapons and found at crime scenes are of the same calibre as normal firearms, and therefore leave few clues at first sight that

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would indicate that the weapon was converted. The forensic analysis of recovered firearms and cartridge cases is potentially helpful in documenting the criminal use of converted firearms in shootings. The Netherlands Forensic Institute (NFI), for instance, identified 162 modified or converted firearms (6.4 per cent) in a data set of 2,533 firearms used in 2,296 firearm-related incidents between 2018 and 2022.<sup>c</sup> The modified firearms identified by the NFI primarily comprised converted “blank/gas” handguns, but a smaller number of Glockes and other real handguns were also assessed to have been modified or reactivated.<sup>22</sup>

- a Ten of these 20 articles refer to converted alarm guns and three to converted gas pistols. The other seven could be the same or refer to other types of converted firearms.
- b The UN Office on Drugs and Crime (UNODC) also identified Slovakia as a source for “trafficking of deactivated, acoustic expansion, Flobert and reactivated firearms”. See UNODC (2020), *Illicit trafficking in firearms, their parts, components and ammunition to, from and across the European Union, regional analysis report*, Vienna: UNODC, pp. 111, 140, [https://www.unodc.org/documents/firearms-protocol/2020/UNODC-EU-Report-A8\\_FINAL.pdf](https://www.unodc.org/documents/firearms-protocol/2020/UNODC-EU-Report-A8_FINAL.pdf).
- c The data set includes both firearms that were recovered by authorities as well as firearms used in crime that were not recovered but that the laboratory could identify based on the examination of spent cartridges. Written correspondence with the Netherlands Forensic Institute, 7 September 2023.

According to police sources, however, converted firearms represent a higher proportion of all seizures in the Netherlands. Indeed, authorities seize around 5,000 firearms annually, of which about 40 per cent are converted or modified firearms (mostly converted alarm and signal weapons and Flobert weapons. While it may well be that converted firearms are not as frequently used in shootings (the focus of ballistic data) as they are found in cases of seizures, forensic data may also underestimate the scope of the issue. This is because it can be challenging for ballistic experts to identify firearms that have been converted, especially when the actual weapon is missing and analysis is based only on the recovered spent cartridges.<sup>23</sup> Overall, data on converted firearms is not systematically collected at the national level, nor is it shared at the EU level, which precludes a comprehensive assessment of the use of converted firearms in crime and shootings.<sup>24</sup>

## 3D-printed firearms and components

First manufactured in the United States, 3D-printed firearms have spread across most continents, including Europe, where cases of seizures, sales offers, and use have occurred in Belgium, Finland, France, Germany, Iceland, Ireland, Italy, Netherlands, Romania, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.<sup>25</sup> According to European authorities, most of the 3D-printed firearms encountered recently are FGC-9 MOD IIs, which do not require factory-built components.<sup>26</sup> Workshops producing 3D-printed firearms were also found in some EU countries. For instance, in May 2021, Finnish customs discovered a workshop manufacturing 3D-printed

firearms and parts in Tampere.<sup>27</sup> Individuals are also actively developing 3D-printed ammunition fabrication processes that risk circumventing domestic and international controls.<sup>28</sup>

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Due to the still-emerging nature of 3D printing of firearms, media reports and official press releases about 3D-printed firearms currently provide limited insight into the scale of the phenomenon. The Incident Monitor was able to capture 17 articles regarding 12

incidents relating to 3D-printed firearms that occurred between 2019 and 2022. These incidents—some of which are discussed below—occurred in Germany, the Netherlands, Spain, and the United Kingdom. Moreover, ongoing manual analysis of media reports found that seizures of 3D-printed firearms and workshops/equipment, sale offers of 3D-printed firearms or parts, and shootings involving these weapons accounted for about 181 such cases occurring globally from January 2014 to July 2023, and that the number of cases overall has increased significantly since 2021. Of these cases, 44 (24 per cent) took place in Europe, making it the second most affected region after North America (108 cases, or 60 per cent). Globally, a total of eight reports of shooting incidents (in which firearms were discharged) were encountered. Six of them occurred in the United States and one each in Canada and Iceland.<sup>29</sup>

## Ghost guns

Ghost guns are assembled from semi-finished frames or receivers and other factory- or privately made components. They are called “ghost guns” because many lack serial numbers and other manufacturer’s markings that are used to trace guns to the last known authorized end user. The components for ghost guns are sometimes sold as

kits that include basic tools, such as milling jigs and drill bits. Common models include Glock pattern pistols and AR-pattern rifles, although sellers offer a broad array of makes and models. Ghost guns and components are sold online in the United States—which is the main market for these types of firearms—and sent to the EU through fast parcel and postal services. Many are then sold illegally in EU member states.<sup>30</sup>

Data on PMFs recently examined by the French National Gendarmerie’s ballistics department

sheds light on the proportions of different types of PMFs encountered by officials in some European

countries. According to French officials, 43 of the 65 PMFs examined by the ballistics department were weapons assembled from partially finished frames and receivers (so-called “P80-type” PMFs). Of

these PMFs, six were AR-15-type rifles and the rest were copies of Glock semi-automatic pistols (Glock models 17, 19, 26, 35, and 43).<sup>a</sup> It should be noted that 30 of the PMFs were seized in French territories in the Caribbean and not on the mainland.<sup>b</sup>

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#### Images 1 and 2 Ghost gun components seized by authorities in France



Note: The contents of a kit for the assembly of a partially finished pistol (left) and two partially finished receivers (right) seized by French authorities.

Source: Institut de recherche criminelle de la gendarmerie nationale (IRCGN) of the French National Gendarmerie

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- a The other PMFs examined by the department consisted of four 3D-printed firearms, including a copy of a Glock 19 and three FGC-9-type rifles, and 18 unspecified “homemade weapons”. The department has also examined numerous PMF components, including 3D-printed AR-15-pattern receivers, magazines, and partially finished P80 frames. Email correspondence with an official from the Institut de recherche criminelle de la gendarmerie nationale (IRCGN) of the French National Gendarmerie.
- b Specifically, 26 of the PMFs were seized in French Guyana, and four were seized in Guadeloupe. Correspondence with a European law enforcement official, September 2023.



## Other PMFs

European authorities have encountered several additional types of PMFs in recent years, including, but not limited to, counterfeit firearms, slam-fire shotguns, converted airsoft guns, and homemade “Luty” sub-machine guns.<sup>a</sup> Of these PMFs, counterfeit firearms and components are of particular concern to some European law enforcement authorities. The term “counterfeit firearms” is used here to refer to illegally produced firearms that are designed and marked to look like an established brand. Some are assembled entirely from counterfeit components, while others are made from a mix of authentic and counterfeit parts, according to a European official interviewed by the Survey. The official also noted that hundreds of counterfeit firearms have been seized since early 2022, many of which originate outside of the EU.<sup>31</sup> Recent seizures in Bulgaria appear to support this claim. In March 2022, Bulgarian officials seized 49 counterfeit firearms branded as Taurus pistols stored in a garage in southern Bulgaria. Media reports indicate that they originated in an unspecified “neighbouring country” and were likely intended for illegal export to Western Europe.<sup>32</sup> Eight months later, Bulgarian customs officials found an additional 35 pistols inside the door and around the engine compartment of a van reportedly traveling from Türkiye to Germany. Media reports of the seizure indicate that the pistols were “home-made and serviceable”.<sup>33</sup>

Privately made accessories for firearms are another growing concern. Perhaps the most

notable are conversion devices—simple, easy-to-install components that convert semi-automatic pistols and rifles into automatic weapons. These items do not look like firearms or their parts, which makes their detection challenging for law enforcement officials who do not possess expert knowledge.<sup>34</sup> The devices are now commonplace in the United States, where authorities have seized

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hundreds of so-called “Glock switches” and other devices in recent years, some of which were marketed and sold online as coat hangers.<sup>35</sup> Existing evidence suggests that conversion devices have not proliferated as widely in Europe, but recent seizures—including the discovery of a 3D-printed auto sear in an AR-15-pattern rifle seized by French authorities in February 2021<sup>b</sup>—raise the specter of increased proliferation and use of these devices in the EU, and the subsequent weakening of controls on automatic weapons.<sup>c</sup>

## Illicit end use and end users of PMFs in the EU

This section reviews data on the types of crimes involving PMFs as well as prominent cases of illicit end uses and end users of these weapons in Europe. Among the different types of PMFs reviewed in this paper, converted firearms appear to be the most common in the EU. Of the ten articles in the Incident Monitor that mention the use of modified blank-firing pistols, seven relate to drugs or murder. In July 2020, for instance, a husband murdered his wife using a modified

a The “Luty” sub-machine gun is a 9 mm PMF popularized by the 1998 book *Expedient Homemade Firearms*, which was written by gun rights activist P.A Luty. The perpetrator of an attempted mass shooting at a synagogue in Halle, Germany, in 2019 was armed with a Luty sub-machine gun and a slam-fire shotgun, among other PMFs. See The Firearm Blog (2019), *Homemade firearms used in Halle attack*, 16 October, <https://www.thefirearmblog.com/blog/2019/10/16/homemade-firearms-used-in-halle-attack/>.

b The owner of the seized rifle reportedly told authorities that he had made the conversion device on his own 3D printer with the help of plans found on the internet. Correspondence with European law enforcement official, March 2021.

c A significant barrier to preventing the trafficking of conversion devices in Europe is the unfamiliarity of law enforcement officials with the devices and the many forms they take. The problem was flagged by a European law enforcement official, who noted that “[w]e have seen examples where these devices were not recognized as weapon parts by officials.” Correspondence with European law enforcement official, September 2023.

blank-firing pistol in Italy.<sup>36</sup> More than half of the cases (506) involving an alarm pistol (whether converted or not) in the Monitor data set were threats or dispute cases. Air gun cases relate primarily to threats, murders, and/or drugs. The picture is different when it comes to replica guns, which mostly appear to be toy guns: 57 per cent of the Monitor cases involving these items were robberies or thefts.

Converted firearms have also been used in Europe to commit serious crimes. For instance, a converted alarm pistol was used in the murder of a well-known journalist in the Netherlands in July 2021. The police found the weapon with ammunition in the getaway car used by the suspects.<sup>37</sup> Aged 21 and 35, the suspects were hired for murder by a criminal organization that has ties in the Netherlands and abroad and is involved in drug trafficking and a series of murders. The organized crime group ordered this killing to silence the victim, who was supporting a witness in the “Marengo” trial against its leader and other members of the group for multiple murders. This murder was part of a series of the most gruesome crimes in the Netherlands in recent years.<sup>38</sup>

Given the emerging nature of the proliferation of other types of PMFs, and notably for 3D-printed firearms, information on their users is lacking.<sup>39</sup> 3D-printed firearms have been used in some cases of violence, including those perpetrated by right-wing extremists. For example, a firearm with 3D-printed components was among the several firearms seized from the German neo-Nazi who perpetrated the attack on a synagogue in Halle in November 2019.<sup>40</sup> Although the perpetrator did not fire this particular weapon, the case is significant because it is the first known instance of violence in Europe involving a (partially) 3D-printed firearm. Moreover, the attacker declared in his manifesto that he wanted to “prove the viability of impro-

vised weapons” for perpetrating right-wing extremist attacks.<sup>41</sup> Documentation on other recent cases also refers to the illicit acquisition of 3D-printed firearms by individuals with right-wing extremist views and motives.<sup>42</sup> While searching a workshop for printing and assembling 3D-printed firearms in September 2020, Spanish authorities found flags and other objects with white supremacist symbols, along with more than 30 manuals on topics such as urban guerrilla warfare, homemade explosives, the use and handling of firearms, and the manufacture of firearms through

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3D printing. The raid also netted 19 3D-printed handgun frames, two 3D printers, and a variety of production equipment and materials. The production of 3D-printed firearms was taking place at the very moment of the raid; author-

ities found a handgun frame being printed when they entered the warehouse.<sup>43</sup>

In June 2022, four British citizens received prison sentences of between three and 12 years for disseminating terrorist publications, encouraging terrorism, and manufacturing and possessing 3D-printed firearms. The men were arrested after posting numerous posts on Telegram “celebrat[ing] racist violence and killing” and “glorify[ing] people who had committed deadly acts of right-wing terrorism around the world”. Authorities found a partially assembled 3D-printed firearm, chemicals, and guides for making explosives at the residences of the defendants.<sup>44</sup> Similar cases have been brought against extremists in Finland, Ireland, and the Netherlands.<sup>45</sup>

There have also been cases involving 3D-printed firearms that relate to suspected arms trafficking without political or ideological motives. For example, a 50-year-old man in Bermeo, Spain, was arrested in September 2022, during the law enforcement “Operation Printer”, for manufacturing 3D-printed firearms and parts (using two

3D printers), ammunition, and explosive devices, as well as for reactivating assault rifles and illegally possessing firearms.<sup>46</sup> Just one month before, another case had occurred in A Coruña, Spain, where a man was arrested for manufacturing 3D-printed weapons, including an AR9 sub-machine gun.<sup>47</sup> In October 2022, a resident in Rotterdam, the Netherlands, was arrested for trying to sell a 3D-printed semi-automatic weapon (as well as ammunition and a silencer), which someone had given to him, to undercover police officers.<sup>48</sup> A few cases involving discharged 3D-printed firearms, not related to violent extremism, have also been reported in the Incident Monitor, including that of a woman in Sweden who fired a .22 calibre 3D-printed firearm in her apartment and towards her neighbour's balcony.<sup>49</sup>

It is important to underscore that not all producers and users of 3D-printed firearms and other types of PMFs have nefarious intentions. Some of the individuals involved in the manufacture of these weapons appear to be hobbyists with a specific interest in firearms and 3D-printing technology and no obvious political or criminal motives.<sup>50</sup>

## Policy implications

This section discusses the policy implications of the proliferation of PMFs in Europe. Previous research has found that most criminals in Europe tend to acquire their firearms locally through criminal connections.<sup>51</sup> PMFs potentially threaten this status quo by providing criminals with more direct access to firearms production. As a result, those interested in acquiring firearms may no longer require local connections or cross-border trafficking. This makes it more difficult for law enforcement and other control agencies to detect and investigate such cases.

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It is increasingly clear that the illicit proliferation of emerging types of PMFs has the potential to undermine the entire normative and institutional infrastructure upon which the international small arms control regime is built.

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It is increasingly clear that the illicit proliferation of emerging types of PMFs, and particularly 3D-printed firearms, has the potential to undermine not just individual national laws and regulations, but the entire normative and institutional infrastructure upon which the international small arms control regime is built. Advancements in 3D-printing technology and the decentralized community of amateur firearms designers that has embraced this technology could weaken controls aimed at preventing the illicit proliferation and use of small arms—both in ways that are already apparent and in ways that are unanticipated. As noted above, existing evidence indicates that, thus far, European criminals have been slow to adopt 3D-printed firearms, preferring factory-built firearms and converted blank-firing guns. The key question is whether increasing access to high quality, inexpensive 3D printers and improvements to 3D-printed firearms designs will eventually tip the scale towards 3D-printed firearms. Even if 3D-printed firearms never supplant factory-built firearms in the European civilian market, it is quite possible that they will become the weapons of choice for certain criminal subgroups, such as right-wing extremists with anti-government ideologies, individuals and groups who prioritize secrecy and anonymity, as well as terrorist sleeper cells and lone wolf militants.<sup>52</sup>

The policy implications of 3D-printed firearms are likely to be most profound in the areas of export controls, customs and border enforcement, and controls on production, which form the backbone of the international small arms control regime developed over the past 25 years. The negotiators of the international instruments in which these controls are enshrined could not have foreseen the advancements in low-cost 3D-printing technology and firearm designs that have made

3D-printed firearms increasingly durable, functional, and accessible. It is not surprising, therefore, that both the relevance and viability of these instruments are threatened by the proliferation of 3D-printed firearms, especially in the most affected regions. This section considers the possible implications of widespread adoption of 3D-printed firearms for national and international small arms controls.

## Implications for controls on production

The potential impacts of 3D-printing on government controls on production are perhaps the most intuitively obvious. As the quality and availability of 3D printers and related materials increases, and the cost, knowledge, and skill required to build functional and durable 3D-printed PMFs decreases, the production of firearms is more likely to become increasingly decentralized, and controls on production increasingly difficult to enforce. These forces are already evident in advancements in the designs and production techniques of 3D-printed firearms over the past decade.

It is unclear whether this pace of advancement will continue, but the constant improvements to 3D-printed firearms made by hobbyists in recent years suggests that the gap between 3D-printed firearms and their factory-built counterparts—in terms of functionality, durability, and variety—will continue to narrow.

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Many of the unlicensed producers of 3D-printed firearms will be unable or unwilling to implement best practices for secure storage, record-keeping, and inventory management.

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Greater interest in—and increased production of—3D-printed firearms by non-licensed producers will increasingly undermine key controls aimed at limiting who produces firearms, as well as the type and quantity of firearms produced. These controls include: (1) licensing and registration requirements for firearm producers; (2) marking and record-keeping requirements for newly produced firearms and components; (3) physical security requirements for facilities in which firearms are produced; and (4) procedures for enforcing standards for the safety of firearms, such as firearm proofing and safety tests. In many countries, these controls apply to producers of 3D-printed firearms, but enforcing them will become significantly more difficult due to the large number of potential producers and their minimal infrastructural footprint. Unlike factory-produced firearms, most of which are manufactured in large, dedicated commercial facilities, the majority of 3D-printed firearms are likely to be produced by individuals or small groups in basements and garages. Many of the unlicensed producers of 3D-printed firearms will be unable or unwilling to implement best practices for secure storage, record-keeping, and inventory management, resulting in a greater risk of theft and loss. Furthermore, any firearms that are lost or stolen and subsequently used in crimes will be more difficult to trace because they are more likely to be unmarked or inadequately marked than factory-built weapons.

## Implications for export controls and border management

The implications for export and border controls are potentially even more profound.<sup>a</sup> International small arms control norms and regimes recommend the establishment of multiple, overlapping export and border controls at every stage of the transfer chain—from pre-licence registration to post-shipment end-use monitoring. These controls provide numerous opportunities for government authorities to detect and prevent arms trafficking throughout the transfer process.

In many cases, the international transfer chain for 3D-printed firearms consists of just two links: the uploading of digital files in the “exporting state” and the downloading of these files in the “importing state”.<sup>b</sup> There are just two parties to the transfer (the “exporter” and the “importer”), and there is no physical interaction between government authorities and the two parties. Consequently, there are no physical inspections or documentation checks at border crossings; no trans-shipment licensing reviews and approvals; and no vetting or licensing of brokers, shipping agents, freight forwarders, and other parties to conventional arms transfers. These controls, which are essential to counter-trafficking efforts, are of no relevance to many international transfers of 3D-printed firearms.

Other controls, such as export licensing requirements and retransfer restrictions, are technically

applicable to files for 3D-printed firearms but are significantly more difficult to enforce than for conventional firearms transfers. In most states, the files are readily available and easily shared online. Curbing the unlicensed dissemination of files for 3D-printed firearms would require a level of government surveillance and control of digital communications that few citizens of EU member states would find tolerable. Without that level of control, consistently detecting and prosecuting violations of licensing requirements for transfers of files for 3D-printed firearms is prohibitively difficult and, without the threat of prosecution, there is little incentive to apply for an export licence. If no licences are requested, this means there are no watchlist screenings, no reviews for red flags, no enforcement of retransfer restrictions (since the government has no record of the initial transfer taking place), and no end-use monitoring. In other words, nearly all of the controls that governments rely on to detect and prevent the international trafficking of firearms are either inapplicable to transfers of files for 3D-printed firearms or very difficult to enforce.

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Other emerging types of PMFs also pose challenges for law enforcement, but not to the same degree as 3D-printed firearms.

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Other emerging types of PMFs also pose challenges for law enforcement, but not to the same degree as 3D-printed firearms. The production of ghost guns requires access to facto-

ry-produced components, which, if categorized as controlled items, are subject to many of the same controls as (finished) firearms. Similarly, the production of counterfeit firearms require access to factory-produced parts and/or specialized skills and equipment. These requirements limit the number of potential producers and exporters of

<sup>a</sup> For a discussion of these issues in relation to earlier and less reliable models of 3D-printed firearms, such as the Liberator, see Brockmann, K. (2018), 3D-printable guns and why export controls on technical data matter, Stockholm International Peace Research Institute (SIPRI), 1 August, <https://www.sipri.org/commentary/blog/2018/3d-printable-guns-and-why-export-controls-technical-data-matter>.

<sup>b</sup> While many, perhaps most, 3D-printed firearms are fabricated, assembled, and used by the same individual or group, there are examples of (physical) transfers of 3D-printed firearms and components to third parties. See, for example, Impro Guns (2023), ‘Men in Sweden charged with smuggling DIY and 3D Printed Glock parts from China,’ 4 March, <https://homemadeguns.wordpress.com/2023/03/04/men-in-sweden-charged-with-smuggling-diy-and-3d-printed-glock-parts-from-china/>. In these cases, the transfer chain is longer and illicit transactions are more vulnerable to detection and interdiction through conventional arms transfer controls.

these types of PMFs and provide opportunities for government intervention. For these reasons, 3D-printed firearms currently pose the greatest potential threat to existing small arms controls.

The prospects for reining in the illicit proliferation of converted firearms in Europe are more promising. European states have taken several steps to strengthen controls on alarm and signal weapons, starting in 2017, when the EU amended the EU Firearms Directive (Directive 91/477/EEC)<sup>53</sup> to require states to classify devices that are capable of being converted as real firearms. Following this amendment, in January 2019 the European Commission (EC) adopted the Implementing Directive (EU) 2019/69, which lays down technical specifications for alarm and signal weapons under Council Directive 91/477/EEC on control of the acquisition and possession of weapons.<sup>54</sup> In October 2022, the EC also proposed to update EU rules on the import, export, and transit of firearms for civilian use with, among other measures, strict technical standards for alarm and signal weapons to avoid them being converted into lethal firearms.<sup>55a</sup> It may take some time for the impact of these measures to be reflected in firearms seizures and crime cases, however, given that there were significant delays in the national implementation of the new regulations in several countries.<sup>56</sup> Moreover, as documented above, significant quantities of readily convertible firearms circulated in the EU prior to these amendments.

## Conclusion

This paper has shown that current firearms seizure data and media-based reports often lack the granularity and details needed to comprehensively analyse and monitor the use of PMFs in crime and violence in the European context. Providing law enforcement officers and journal-

ists with the necessary knowledge and skills to detect and report on PMFs will be critical to better evaluating trends and responses in the future.

In spite of these limitations, available information does provide some insight into the proliferation of PMFs in EU member states. While factory-produced weapons seem to remain the most commonly encountered illicit firearms in most European states, the number of PMFs seized by authorities and used by criminals appears to be increasing. As in previous years, the available data suggests that converted

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**3D-printed firearms pose the greatest potential challenge to national and international small arms controls.**

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firearms continue to comprise the largest share of PMFs. These are also the weapons that have received the most attention from European law enforcement and policymakers, who have made significant progress in strengthening laws and regulations governing alarm, deactivated, acoustic expansion, and Flobert-calibre weapons. It is too early to tell whether these changes have had a significant impact on the accessibility of converted firearms for criminals but the sustained, coordinated action on this issue by EU member states is encouraging.

The immediate threat posed by other types of PMFs, including counterfeit weapons, ghost guns, and 3D-printed firearms, is currently low. Nevertheless, the recent use of these weapons by violent criminals in France, Germany, and the Netherlands, among other countries, cautions against complacency, as do recent improvements in the cost, durability, and functionality of PMFs. Of the weapons analysed in this paper, 3D-printed firearms pose the greatest potential challenge to national and international small arms controls. Some developers of recent-generation 3D-printed firearms purposefully eliminated the need for factory-produced components, and the equipment, materials, and technical data required to produce them are inexpensive and readily avail-

a The Commission will also establish a list of non-convertible alarm and signal weapons.

able. It is impossible to predict whether 3D-printed firearms will overtake their factory-produced counterparts as the weapons of choice for European criminals, but if they do many critically important small arms controls will lose relevance or become more difficult to enforce. Addressing this new threat will require fresh thinking and concerted action by governments at the national, regional, and international levels. Given their resources and lessons learned from tackling converted firearms, the EU and its member states are better positioned than most regions to respond effectively to the proliferation of new generations of PMFs, but they must act fast if they are to minimize the damage from this threat.

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## Project INSIGHT

Project INSIGHT is an initiative that aims to prevent violence by enhancing the visibility of firearm violence in the European Union. With an online knowledge platform ([www.gunviolence.eu](http://www.gunviolence.eu)) as its primary tool, the project also entails the creation of eight research reports on various themes of firearms violence. Project INSIGHT is funded by the European Union's Internal Security Fund - Police.

Project INSIGHT is coordinated by the Flemish Peace Institute. The Flemish Peace Institute was established in 2004 as a para-parliamentary institution within the Flemish Parliament. It provides thorough analyses, informs and organizes the debate and promotes peace and the prevention of violence. In the past the institute has coordinated other EU-funded projects on firearms such as SAFTE, DIVERT and TARGET.

The publication process of the Project INSIGHT research reports was supervised by the Small Arms Survey. The Small Arms Survey strengthens the capacity of governments and practitioners to reduce illicit arms flows and armed violence through three mutually reinforcing activities: the generation of policy relevant knowledge, the development of authoritative resources and tools, and the provision of training and other services.

Other partners in the Project INSIGHT-network include Textgain, SIPRI, and the Institute of Security and Global Affairs at Leiden University. The project also receives support from the Belgian Federal Police, Europol, European Firearms Experts, Dutch National Police and SEESAC.

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