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| <p>“DRAGON DRONES” – THERMITE UAS IN MILITARY OPERATIONS.</p> <p><u>Abstract:</u></p> <p>In the summer of 2024, the first reports of “Dragon drones” in the Ukraine War was covered on social media. Videos were showing the “Dragon Drones” spewing out molten metal flakes on the battlefield. Combing Thermite and drones has never been done in modern warfare before. This raises questions of what exactly these drones are and what they are capable of? But also, what can the observations from The War tell us, are they legal? And if so, why?</p> <p>The aim of this thesis is to investigate the use of Thermite UAS in the Ukraine War. The first question is based on whether Thermite UAS can be considered an incendiary weapon according to CCW Protocol III. Second, whether this weapon system can be considered Natural or Calculated in relation to superfluous injury and unnecessary suffering under Customary International Humanitarian Law.</p> <p>The result has found that Thermite is not covered by CCW because the convention specifically excludes thermite against military objectives and combatants. But the same time Thermite is covered by CCW if the conduct is considered to cause superfluous injury and unnecessary suffering. According to observations the result suggest that only military objectives have been targeted. A distinction from civilians and civilian objects has been made. The research also suggest that there is a gap between CCW and Customary International Humanitarian Law. The discourse on incendiary weapons and LAWS tends to fall in under the category of AI. The author argues that the answer to the gap between CCW and Customary International Humanitarian Law is found within the human responsibility of commanders and UAS operators. Depending on the assessment of military advantage gained from a Thermite strike it is important to balance the military necessity versus humanity in that specific military operation, due to the unique circumstances</p> <p><u>Keywords:</u> Dragon Drones, IHL, CCW Protocol III, Customary IHL, Thermite UAS, Ukraine War.</p> | | |

Table of Content

| | | |
|-------|--|----|
| 1. | Introduction | 3 |
| 1.1 | Historical context | 3 |
| 1.2 | Framing the problem | 4 |
| 1.3 | Research questions | 6 |
| 1.4 | Methodology and research | 6 |
| 1.5 | Sources | 7 |
| 2. | Thermite UAS | 8 |
| 2.1 | Thermite | 8 |
| 2.2 | UAS | 8 |
| 3. | Legal scope | 11 |
| 3.1 | IHL | 11 |
| 3.1.1 | Fundamental principles of IHL | 11 |
| 3.1.2 | Means and Methods of Warfare | 11 |
| 3.1.3 | Additional Protocol I | 12 |
| 3.2 | Certain Conventional Weapons | 15 |
| 3.2.1 | CCW | 15 |
| 3.2.2 | Group of Governmental Experts | 17 |
| 3.2.3 | CCW Protocol III: | 17 |
| 3.3 | CIHL | 21 |
| 4. | Discussion | 23 |
| 4.1 | Observations from The War | 23 |
| 4.2 | Thermite UAS and LAWS | 27 |
| 4.3 | Thermite UAS and IHL | 29 |
| 4.4 | Conclusions | 33 |
| 5. | Summary | 34 |
| 5.1 | Answering the questions | 34 |
| 5.2 | Continued research | 35 |
| 6. | Bibliography | 36 |
| 6.1 | Conventions and legal sources | 36 |
| 6.2 | Sovereign states of Ukraine and Russian Federation | 37 |
| 6.3 | UN, ICRC and GGE | 38 |
| 6.4 | Literature | 40 |
| 6.5 | Journals and articles | 42 |
| 6.6 | Internet | 43 |
| 6.7 | Video material | 45 |
| 6.8 | Picture | 46 |
| 6.9 | Other | 47 |

1. Introduction

1.1 Historical context

Fire has been essential for human development throughout history, but also a tool of warfare. More sophisticated fire weapons have been part of in military operations for several millennia. The earliest historical examples documented are the Siege of Petra, in 550 BC, when arrows dipped in pitch, tar and resin were used to set military forces and wooden fortifications on fire.¹ During the Siege of Rochester 1215 animal fat functioned as fuel, scorching the attacking force.² In the battle of Rochelle 1627-1628 hot oil were poured down from the castle walls scalding the attacking force.³ In naval battles setting enemy ships on fire was the most effective way of sinking them, thus winning the battle.⁴ Fire forced modern armies to build thicker fortifications in stone and other non-flammable materials. With gunpowder came more advanced weaponry allowing penetration of thicker and thicker walls from further distances and still destroying military forces and fortifications. Modern examples of thermal weapons are phosphor creating smoke used to conceal movements.⁵ During WWI Germans developed melting metal flakes (Thermite) in order to cut through enemy steel bunkers and other heavenly fortified positions.⁶ Flamethrowers were used in WWI and especially in WWII to destroy enemy fortified positions.⁷ ⁸ Napalm were most commonly used during the Vietnam War burning down vast wooded areas denying enemy concealment.⁹ From this historical context we can establish that thermal weapons has had the intent of destroying military units and fortifications. Regardless on types of weapons, the aim of warfare is to disrupt the enemy's ability to fight and to impose your will on that enemy.¹⁰ ¹¹ In

¹ Geoffrey Greatrex, Samuel N.C Lieu, *Justinian's Second Persian War: the northern front (540-562): The Roman Eastern Frontier and the Persian Wars: Part II, AD 363-630*, Routledge, Abingdon, 2002, p 115.

² Reginald Allen Brown, *Rochester Castle*, Her Majesty's Stationery Office, London, 1969, p 12.

³ Christopher Duffy, *Siege Warfare: The Fortress in the Early Modern World 1494-1660*, 1995, Routledge, p 125.

⁴ Battle of Salamis 480 BC, First Punic Wars 264-241 BC, Battle of Svolder 1000 AD, Battle of Lepanto 1571 AD, Battle of Trafalgar 1805 AD.

⁵ Lacroix-Defense, *GALIX-system smoke grenade launchers*, <https://www.lacroix-defense.com/produit.php?langue=en&code=galix&pole=land#>, accessed 2024-12-07.

⁶ Ramnath Goenka, "Bitter Fighting in Libya", *The Indian Express* (Madras 1941-11-26), <https://news.google.com/newspapers?id=AdA-AAAIBAJ&pg=2697,5764756>, accessed 2024-12-07.

⁷ Micheal Clodfelter, *Warfare and Armed Conflicts: A Statistical Encyclopedia of Casualty and Other Figures, 1492-2015*, 4th Ed. McFarland, Incorporated, Publishers, 2017, p 394.

⁸ Randy Holderfield, *D-Day: The Invasion of Normandy June 6 1944*, 2001, Da Capo Press, p 76.

⁹ Marine Guillaume, *Napalm in US Bombing Doctrine and Practice 1942-1975*, *The Asia-Pacific Journal* (Volume 14, Issue 23, Number 5), 2016, accessed 2024-12-07.

¹⁰ Carl von Clausewitz, *On War*, Bonnier Fakta Publishing (translation by Hjalmar Mårtenson, Klaus-Richard Böhme and Alf W Johansson), Stockholm, 1991, p 29.

¹¹ Sun Zi, *The Art of War*, Arcturus Publishing Limited, London, 2015, p 28.

short Thermal Weapons have been an integral asset of any military arsenal and will also continue to serve a function in future military operations.

1.2 Framing the problem

The Ukraine War (The War) is a war where both belligerents have the capacity to use Thermal Weapons. Since the Russian invasion in February 2022, 82 documented ground-to-ground artillery strikes have been fired containing Incendiary Weapons.¹² Both Russia and Ukraine possess 122mm Grad rockets.¹³ ¹⁴ During the Battle of Bakhmut in December 2022 Russian Forces fired Grad rockets with incendiary munition with no distinction of military targets, civilian population or civilian objects.¹⁵ During the Siege of Azovstal Iron Plant in 2022 Russian forces fired Thermal artillery shells on Ukrainian forces. The artillery grenades were loaded with Thermite.¹⁶ During the summer of 2024, on different social media platforms,¹⁷ several videos were released showing Ukraine Forces air-dropping Thermite from Unmanned Aircraft Systems (UAS) on Russian military forces.¹⁸ Media outlets have used the name “Dragon Drones” to describe its destructive capacity “spewing out fire” on an adversary force,¹⁹ from now on these “Dragon Drones will be referred to as Thermite UAS. The existence of Thermite UAS and its deployment in The War have been officially recognized by Ukraine Defense Ministry.²⁰ ²¹ Further, the use of Thermite UAS in September 2024 were confirmed officially by four different Ukrainian regional commands²² Operational Command

¹² Human Rights Watch, *Incendiary Weapons; Recent Developments and Use* (HRW 2023-05-12), <https://www.hrw.org/news/2023/05/12/incendiary-weapons-recent-developments-and-use>, accessed 2024-12-07.

¹³ Jamie Prenatt, Adam Hook, *Katyusha; Russian Multiple Rocket Launchers 1941-Present*, Osprey Publishing Ltd, Oxford, 2016, p 32.

¹⁴ The International Institute for Strategic Studies, *The Military Balance 2023*, Routledge, Abingdon, 2023, p 239.

¹⁵ OSINTechnical, *Bakhmut, Russian shelling with 122mm Grad 9M22S incendiary rockets* (2022-12-17), <https://x.com/Osinttechnical/status/1603896021813235719>, accessed 2024-12-07.

¹⁶ David Hambling, *White Phosphorus Claimed To Be Used In Ukraine May Really Be Russian Napalm Weapon*, *Forbes* (2022-04-12), Forbes Business Aerospace and Defense, <https://www.forbes.com/sites/davidhambling/2022/03/25/white-phosphorus-may-really-be-soviet-napalm-weapon/>, accessed 2024-12-07.

¹⁷ Telegram <https://telegram.org/>, X <https://x.com/home>, YouTube <https://www.youtube.com/>, accessed 2024-12-07.

¹⁸ Le Monde, *A New Addition to the Ukrainian Army's Arsenal: The Dragon Drone Fires an Incendiary Weapon* (2024-09-07), https://www.lemonde.fr/en/international/article/2024/09/07/a-new-addition-to-the-ukrainian-army-s-arsenal-the-dragon-drone-fires-an-incendiary-weapon_6725122_4.html, accessed 2024-12-07.

¹⁹ CNN, *Ukraine: Thermite Dragon Drones* (2024-09-07), <https://edition.cnn.com/2024/09/07/europe/ukraine-thermite-dragon-drones-intl-hnk-ml/index.html>, accessed 2024-12-07.

²⁰ Defense of Ukraine, *Official page of the Ministry of Defense of Ukraine* (joined 2012-07-01), https://x.com/DefenceU?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor, accessed 2024-09-11.

²¹ Defense of Ukraine, *A “dragon drone” in the Kharkiv direction* (2024-09-04), <https://twitter.com/DefenceU/status/1831312003404865561>, accessed 2024-09-21.

²² Ministry of Defence of Ukraine, *White Book 2016 The Armed Forces of Ukraine*, https://www.mil.gov.ua/content/files/whitebook/WB_2016_ENG_WEB.pdf, 2017, Kyiv, accessed 2024-12-07.

East²³, Operational Command South²⁴, The Territorial Defense Forces²⁵ and the 10th Operational Corps²⁶. Ukraine commanders and media outlet sources have commented that the Thermite is used to intimidate terrorize and scare Russian soldiers forcing them out of their trenches, and in the chaos get targeted with artillery by Ukrainian Fire Support Teams.²⁷ Also, reports have showed Russian Forces developing and testing Thermite UAS themselves. The available video material shows UAS's sweeping through the landscape, burning down forests, hedgerows, and wooded areas. It is not obviously clear from this material that a targeting process is making a distinction between military targets, civilians, and civilian objects. The combination of Thermite and UAS deployed together has never been reported in military warfare history before The War started in 2022. This new weapon system has created a potential incendiary thermal weapon platform with the capability to precisely and discriminate strike military targets, but if deployed wrongfully the effects could be catastrophic and indiscriminate.^{28 29} Thermite UAS might also be stuck between different legal scopes within International Humanitarian Law (IHL) since it lacks any clear definition. Understanding the means and intended design of Thermite UAS is important because it raises the question if and how Thermite as an incendiary weapon may or may not be covered under existing legal scopes in IHL. The use of this new weapon system is likely to evolve and become more sophisticated and more frequently used by both Ukraine and Russia during next year 2025.³⁰ Therefore raising questions on the means of warfare with Thermite weapons in the War needs to be studied, analyzed and discussed in relation to IHL.

²³ Defense of Ukraine, "Dragon" drones in action (2024-09-24), <https://x.com/DefenceU/status/1838647589358432422>, accessed 2024-12-07).

²⁴ Defense of Ukraine, A "dragon drone" in the Kharkiv direction, n 21.

²⁵ MilitaryNewsUA, Ukrainian FPV drone burns Russian positions with thermite (2024-09-02), https://x.com/front_ukrainian/status/1830550497452757350, accessed 2024-12-07.

²⁶ Noelreports, Khorne Group within the 116th Mechanized Brigade demonstration the new dracarys drone, dropping flammable substances over Russian positions (2024-09-05), <https://x.com/NOELreports/status/1831775791551803666>, accessed 2024-12-07.

²⁷ Kyiv Post, Dracarys! Ukraine's Fire-Spewing "Dragon Drones" Give Russian Troops a "Headache" (2024-09-08), <https://www.kyivpost.com/post/38609>, accessed 2024-12-07.

²⁸ Saxon, Dan, *International Humanitarian Law and the Changing Technology of War*, Martinus Nijhoff Publishers, Leiden, The Netherlands, 2013, p 337.

²⁹ William Boothby, *Weapons and the Law of Armed Conflict*, Oxford University Press, 2009, p 346.

³⁰ Sky News, Professor Michael Clarke assesses Ukraine's dragon drones Ukraine War (2024-10-05), <https://www.youtube.com/watch?v=xnYsv1diMH0&t=189s>, accessed 2024-12-07.

1.3 Research questions

The purpose of this thesis is to investigate and analyze the legal implications on the use of Thermite UAS in military operations. Therefore, this thesis wants to research the following two questions:

1. *Whether Thermite UAS weapons, as a means of warfare are or may be incendiary weapons and if so, when may they be covered by CCW Protocol III?*

And:

2. *Whether Thermite UAS weapons, in the Ukraine War, as a means of warfare can be considered "natural" or "calculated" to cause superfluous injury and unnecessary suffering under Customary International Humanitarian Law?*

1.4 Methodology and research

To analyze the first question, we need to understand what Thermite UAS is. This will be clarified in chapter 2, by separately clarifying Thermite and UAS. In chapter 3 International Humanitarian Law (IHL), Certain Conventional Weapons³¹ (CCW) and Customary International Humanitarian Law^{32 33} (CIHL) are analyzed in relation to Thermite UAS and its contextual military operational framework in armed conflict. In this chapter an understanding of Means and Methods is provided. These terms are relevant in relation to the first question of incendiary weapons and when they may be covered in the CCW. To understand the second question within the framework of CIHL the terms Natural, Calculated, Superfluous injury and unnecessary suffering³⁴ (SiRUS) are analyzed.^{35 36 37} The output from the legal scope will be discussed in chapter 4 in relation to different observations on the deployment of Thermite

³¹ Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effect (CCW)(adopted 1980-10-10, entered into force 1983-12-02), Protocol III on Prohibitions or Restrictions on the Use of Incendiary Weapons (1980), 1342 UNTS 171, art 1.

³² International Committee of the Red Cross ICRC), *Customary IHL Database*, (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1>, accessed 2024-12-07.

³³ International Law Commission, *Draft Conclusions on Identification of Customary International Law with commentaries* (A/73/10), seventh session, 2018.

³⁴ ICRC, *Unnecessary suffering or superfluous injury* (2024-12-07), https://casebook.icrc.org/a_to_z/glossary/unnecessary-suffering-or-superfluous-injury-0#:~:text=IHL%20prohibits%20the%20employment%20of,will%20be%20hors%20the%20combat, accessed 2024-12-01.

³⁵ Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land. The Hague, 18 October 1907, art 23(e).

³⁶ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, art 35(2).

³⁷ Customary IHL, Rule 7. *The Principle of Distinction between Civilian Objects and Military Objectives* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule7>, accessed 2024-12-07.

UAS in the War. The discussion derives from observations involving Thermite UAS strikes between June 2024 to November 2024 in The War, followed by an attempt to give a definition of what Thermite UAS is. The rationale of defining Thermite UAS is for future analysis either to accept or discard or alternate this definition, under the assumption that it leads to better future academic research. Therefore, we need to analyze the legal scope on real world observations with the best research data available at the moment in order to understand this new weapon system. A conclusion will close the discussion and lastly answers are given to the research questions.

1.5 Sources

The primary sources are IHL, CCW and CIHL. IHL and CIHL restrict and/or prohibit the use of deadly violence in armed conflict and making distinction between combatants and civilians. CCW defines, prohibits, and restricts the use of incendiary weapons. The observation material are secondary sources, such as video material from social media platforms X, Telegram and YouTube. The rationale behind using secondary material is that The War, as in most wars, is also a war of information. Ukraine Defense Ministry officially uses X³⁸ and Telegram,³⁹ which are linked from the Ukrainian official website⁴⁰ they provide information on the latest content in relation to military operations of The War making these sources open for Open-Source Intelligence⁴¹ (OSINT). The information is provided primarily on specific social media platforms, which enables a scanning-process of these platforms, which are relevant and essential to understand the deployment of Thermite UAS. The same information is not possible to extract from Russian Defense Ministry, since many official websites are blocked, for example, the Russian Defense Ministry website translated in English.⁴² However, it is possible to scan the observation material with the same OSINT-methods in order to connect several sources independent of each other. Psychological Operations⁴³ (PSYOPS) are an important tool in warfare in order to deliver a message of

³⁸ General Staff of the Armed Forces of Ukraine, *The official account of the General Staff of the Armed Forces of Ukraine* (joined 2015-10-01), <https://x.com/GeneralStaffUA>, accessed 2024-11-26.

³⁹ UA Land Forces, *Official Telegram Channel of the Ground Forces*, <https://t.me/landforcesofukraine>, accessed 2024-11-26.

⁴⁰ Ministry of Defence of Ukraine, *Land Forces* (2024-11-26), <https://mod.gov.ua/en/about-us/land-forces>, accessed 2024-11-26.

⁴¹ UNHR, *Berkley Protocol on Digital Open Source Investigations; A Practical Guide on the Effective Use of Digital Open Source Information in Investigating Violations of International Criminal, Human Rights and Humanitarian Law* (2022-01-03), <https://www.ohchr.org/en/publications/policy-and-methodological-publications/berkeley-protocol-digital-open-source>, accessed 2024-11-26.

⁴² Ministry of Defence of The Russian Federation, (2024-12-07), <https://eng.mil.ru/>, accessed 2024-12-07.

⁴³ North Atlantic Treaty Organization (NATO), *Allied Joint Doctrine for Psychological Operations; AJP-3.10.1(A)* (2007-10-22), accessed 2024-11-26.

intent or to deceive other intentions and capabilities, that is the nature of war.⁴⁴ Even though Ukraine hypothetically were deceiving their Thermite UAS capabilities this research would still be important, because the technological components are realistic and possible and it would still raise questions of what Thermite UAS is and what it's not. However, the deployment of Thermite UAS has been verified and the rationale is therefore to discuss as many valid observations of Thermite UAS as possible.

2. Thermite UAS

2.1 Thermite

Thermite is a pyrotechnic composition of metal powder and metal oxide. Initially Thermite served as a tool for welding, because when ignited by heat or by a chemical reaction the boiling point can reach up to 2500 degrees Celsius. There are several types of metal compositions. Different metal compositions give different characteristics when welding. In military operations the intended design of Thermite is to destroy military targets such as cutting or melting, through military equipment, vehicles and fortifications.⁴⁵ The Thermite payloads in the War have varied from a couple of hundred grams up to a couple of kilograms, depending on the actual UAS payload capacity.⁴⁶ The thinner the armor, the better for the Thermite's penetration ability. The thinnest layers are the roof of armored vehicles, thus making the ideal strike angle from above, described as, from air-to-ground.⁴⁷ In short, Thermite acts like a butterknife on armor alloys. It is also important to clarify that the specific payload capacity is constantly evolving as The War continues.

2.2 UAS

On the civilian markets UAS are often mentioned as First Person View (FPV) Drones, Unmanned Aerial Vehicles (UAV) and other Unmanned Aircraft (UA).⁴⁸ Those terms only refer to the Unmanned Aircraft itself and not the operator. This is the reason behind using the term UAS. UAS consists of three components. A flying system, with one or several operators

⁴⁴ Sun Zi, *The Art of War*, Arcturus Publishing Limited, London, 2015, p 19.

⁴⁵ Swedish Defence University, *Handbook in Military Technology Chapter 4 "Effect and Protection"* (authors translation), Stockholm, 2009, p 74.

⁴⁶ Institute for the Study of War, *Ukraine and the problem of restoring maneuver in contemporary war*, Washington D.C, 2024, p 67.

⁴⁷ Larry Fischer and Mark Grubelich, *The Use of Combustible Metal in Explosive Incendiary Devices*, Sandia National Laboratories, Albuquerque, 1996, p 1.

⁴⁸ NATO, *NATO Standard AJP-3.3 Allied Joint Doctrine for Air and Space Operations STANAG 4670*, Edition B Version 1, 2016. p 1-3.

and a data link that makes the flying system steerable.⁴⁹ This definition stems from NATO's Allied Tactical Publication (ATP) on minimum training requirements for Unmanned Systems.⁵⁰ The rationale behind using the NATO definition of UAS is transparency. It is therefore possible via OSINT material to analyze the capabilities of operators and specific UAS's. At the same time, it is nearly impossible to make OSINT research on Russian or Chinese framework regarding UAS due to that those nations lack transparency. The operator aspect is important to understand the analysis of the legal scope in regard to military targets, incendiary weapons and the terms Natural and Calculated. NATO has three UAS classifications, Class I, II and III.⁵¹ The classifications are categorized in weight, mission radius, flight above-ground-level (AGL) and different types of data links. Class III weighs more than 600kg, has a mission radius around the entire earth. It operates between 20 000m – 13 000m AGL. Examples are Reaper⁵², Global Hawk⁵³ and Heron⁵⁴. Class II weighs between 600-150kg and has a mission radius up to 200km. It operates between 13 000m – 1500m AGL. Examples are Watchkeeper⁵⁵ and Shahed⁵⁶, the latter has been used by Russia in The War.⁵⁷ Class I is the most common UAS in The War and the most relevant to analyze. They can weigh up to 150kg and have a mission radius up to 50km. However, radiuses are evolving constantly in The War, and Class I operates up to 1500m AGL. In The War the manufacturer DJI seems to be the most used UAS by Ukrainian Forces. Others brands such as Dual enterprise, RQ-11 Raven etc. have been reported in the War,⁵⁸ but overall DJI Mavic⁵⁹ and DJI Matrice 300⁶⁰ seems to be the UAS preferred by Ukraine.

⁴⁹ Joint Air Power Competence Center (JAPCC), *Drone drill; How to Prepare for a Drone Incident*, JAPCC, Kalkar, Germany, 2024, p 6.

⁵⁰ NATO, *Allied Tactical Publication (ATP) 3.3.8.1 "Minimum Training Requirements for Unmanned Aircraft Systems (UAS) Operators and Pilots"*, Edition B, Version 1, 2019.

⁵¹ Ibid, p 2-2.

⁵² General Atomics, *MQ-9 Reaper* (2024-12-07), <https://www.ga-asi.com/products-services>, accessed 2024-12-07.

⁵³ Northrop Grumman, *RQ-4 Global Hawk* (2024-12-07), <https://www.northropgrumman.com/what-we-do/air/global-hawk>, accessed 2024-12-07.

⁵⁴ Israel Aerospace Industries, *Heron* (2024-12-07), <https://www.iai.co.il/p/heron>, accessed 2024-12-07.

⁵⁵ Thales, *Watchkeeper WK 450* (2024-12-07), <https://www.thalesgroup.com/en/countries/europe/uk-kingdom/markets-we-operate/defence/air-systems-uk/isr-air/watchkeeper>, accessed 2024-12-07.

⁵⁶ Shahed Aviation Industries, *Shahed 136* (2024-12-07), <https://aviationweek.com/defense/shahed-129-heads-irans-armed-uav-force>, accessed 2024-12-07.

⁵⁷ The Guardian, *Zelensky fears Ukraine is testing ground for Russian weapons amid rise in Shahed strikes* (2024-11-24), <https://www.theguardian.com/world/2024/nov/24/zelenskyy-fears-ukraine-is-testing-ground-for-russian-weapons-amid-rise-in-shahed-strikes>, accessed 2024-12-08.

⁵⁸ Institute for the Study of War, n 46, p 1.

⁵⁹ DJI, *Mavic series* (2024-12-07), <https://www.dji.com/se/products/camera-drones#mavic-series>, accessed 2024-12-07.

⁶⁰ DJI, *Matrice 300* (2024-12-07), <https://www.dji.com/se/support/product/matrice-300>, accessed 2024-12-07.

*“The DJI Mavic is the workhorse of the War”*⁶¹.

In the case of Russia, some examples of UAS used in the War are in the range of Class I and II such as, Forpost, Orlan-10, Shahed and Eleron.⁶² The intended design and purpose of DJI was predominantly to be sold commercially for non-military purposes available to hobbyists and recreational use.⁶³ Class III and II seems to be used to a lesser extent compared to the initial phase of The War. The reason has been that the heavier Classes are more expensive and harder to replace when lost. The lower cost of Class I systems has been more desirable to the Ukrainian Forces. The cost per loss ratio has made more economical sense due to Ukraine’s lesser resources available compared to Russia’s.^{64 65}



Picture 1: Ukrainian UAS operator before take-off, 2023-03-05.

⁶¹ Drone operator 41st Brigade of Ukraine Forces, *The Terrifying Reality of Drone Warfare in Ukraine; Frontline Marathon; cited at 8min 28 sec*, (2024-08-13), Daily Mail, Length 52 min 22 sec, <https://www.youtube.com/watch?v=wXE2Pg9CSSA>, accessed 2024-11-17.

⁶² Pavel Luzin, *Russian Military Drones Past Present and Future of the UAV industry*, Foreign Policy Research Institute, 2023, Philadelphia PA, p 16.

⁶³ Joint Air Power Competence Center (JAPCC), n 49, p 6.

⁶⁴ Institute for the Study of War, n 46, p 67.

⁶⁵ The Telegraph, *Ukraine asks for cluster bombs to help arm its drones; American senators reveal Kyiv plans to disassemble munitions to create armor-piercing bomblets* (2023-03-07), <https://www.telegraph.co.uk/world-news/2023/03/07/ukraine-asks-us-send-cluster-bomb-munitions-use-drones/>, accessed 2024-11-16.

3. Legal scope

3.1 IHL

3.1.1 Fundamental principles of IHL

IHL is the branch of International Law that seeks to impose limits on the destruction and suffering caused by armed conflict.^{66 67} The fundamental principles of IHL are stated as, (1) humanity, (2) distinction, (3) proportionality, (4) military necessity (from where SiRUS derives) and (5) precaution.^{68 69 70}

3.1.2 Means and Methods of Warfare

The St Petersburg Declaration relating to Explosive Projectiles 1868 states in its preamble that:

*“...in order to examine the expediency of forbidding the use of certain projectiles in time of war **between civilized nations**, and that Commission having by common **agreement fixed the technical limits at which the necessities of war ought to yield to the requirements of humanity...**”⁷¹*

The St Peterburg 1868 developed into The Hague 1899 and The Hague 1907 which further continued to regulate Laws and customs of land warfare,⁷² such as the prohibition of asphyxiating gases⁷³ and expanding bullets⁷⁴. Also, The Hague from 1907 further developed the regulation on the deployment of sea mines.⁷⁵ The same convention was later tested against the development of torpedoes during WWI which later advanced to the first rudimentary cruising missiles in WWII. From cruising missiles, development has advanced into today’s self-propelled, guided, and unguided missiles. For the first half of the 20th century both Hague 1899 and 1907 were the primary sources regulating the Means and Methods of

⁶⁶ ICRC, *Fundamental Principles of IHL* (2024-12-07), https://casebook.icrc.org/a_to_z/glossary/fundamental-principles-ihl, accessed 2024-11-30.

⁶⁷ The Hague Convention 1907 (V) respecting the Rights and Duties of Neutral Powers and Persons in Case of War on Land, *Preamble*. GC I art 63, GC II art 62, GC III art 142, GC IV art 158, AP I and II.

⁶⁸ ICRC, *Fundamental principles of IHL*, n 62.

⁶⁹ Gary Solis, *The Law of Armed Conflict International Humanitarian Law in War*, second edition, Cambridge University Press, Cambridge, 2016, p 552.

⁷⁰ Dan Saxon, n 28, p 348 and p 37-39.

⁷¹ Saint Petersburg Declaration 1968 Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight, *Preamble*.

⁷² Hague Convention 1899 (II) with the Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land.

⁷³ Hague Convention 1899 (IV,2) concerning Asphyxiating Gases.

⁷⁴ Hague Convention 1899 (IV,3) concerning Expanding Bullets.

⁷⁵ Hague Convention 1907 (VIII) relative to the Laying of Automatic Submarine Contact Mines.

warfare. The Hague from 1907 is also important in today's aspect of Thermite UAS due to that the preamble's recognition of the Marten Clause.⁷⁶

*"...the wording of which has been inspired by the desire to diminish the evils of war, as far as military requirements permit, are intended to serve as a general rule of conduct for the belligerents in their mutual relations and in their relations with the inhabitants."*⁷⁷

In relation to Means of warfare article 22 of The Hague 1907 states that:

*"The right of belligerents to adopt means of injuring the enemy is not unlimited."*⁷⁸

Further article 23 prohibits:

*"... (c) To kill or wound an enemy who, having laid down his arms, or having no longer means of defence, has surrendered at discretion... (e) To employ arms, projectiles, or material calculated to cause unnecessary suffering... (g) To destroy or seize the enemy's property, unless such destruction or seizure be imperatively demanded by the necessities of war..."*⁷⁹

Both Ukraine⁸⁰ and Russia⁸¹ have ratified The Hague 1899 and 1907. Both Ukraine and Russia are bound by limited warfare in terms of Means of warfare. These obligations in ratification and state practice of both article 22 and 23 of The Hague 1907, together with the Marten Clause are today considered CIHL.⁸² In short Means and Methods of warfare is related to the scope of The St Petersburg 1868 and The Hague 1899 and 1907 and their considerations of the fundamental IHL principles, such as the principle of prohibition of SiRUS.

3.1.3 Additional Protocol I

Ukraine ratified AP I upon becoming a sovereign state in 1990.⁸³ Russia ratified AP I in 1989 with reservations, which didn't affect the Soviet Union at the time to full fill its obligation to

⁷⁶ Christer Ahlström et.al, *Deadly Autonomous Weapon Systems – Report to the IHL and Disarmament delegation* (author's translation), Swedish Ministry of Foreign Affairs, Stockholm, 2020, p 8.

⁷⁷ Hague Convention 1907 (IV), n 35, *Preamble*.

⁷⁸ Ibid, art 22.

⁷⁹ Ibid, art 23.

⁸⁰ Ukraine, *Signature and Ratification*, <https://ihl-databases.icrc.org/en/ihl-treaties/treaties-and-states-parties?title=&topic=&state=UA&from=&to=&sort=state&order=ASC>, accessed 2024-12-07.

⁸¹ Russia, *Signature and Ratification*, <https://ihl-databases.icrc.org/en/ihl-treaties/treaties-and-states-parties?title=&topic=&state=RU&from=&to=&sort=state&order=ASC>, accessed 2024-12-07.

⁸² Christer Ahlström et.al, n 76, p 16.

⁸³ Ukraine, *Signature and Ratification*, n 80.

AP I. After the fall of the Soviet Union the international community recognized Russia as the new state to continue to uphold its obligations towards AP I.⁸⁴ However, in the aftermath of the annexation of Crimea 2014, Russia withdrew from AP I in 2019. How this withdrawal affects Russia's obligations is still debated between states. The international community consider Russia still obligated to uphold fundamental IHL principles even though via other legal sources.^{85 86}

Article 35 defines the basic rules of AP I, such as the fundamental IHL principle of prohibition on SiRUS, it states that:

*“1. In any armed conflict, the right of the Parties to the conflict **to choose methods or means of warfare is not unlimited**...2. It is **prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering**...3. It is **prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.**”⁸⁷*

Article 36 operationalizes article 35 in a way that the decision on the deployment of a weapon system should be based on whether the use constitutes “normal use”⁸⁸. This article declares the obligation of studying new weapons:

“In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.”⁸⁹

The praxis on studying new weapon systems is also confirmed by ICRC:

“For a State producing weapons...reviews should take place at the stage of the conceptions/design of the weapon, and thereafter at the stages of its technological

⁸⁴ Russia, *Signature and Ratification*, n 81.

⁸⁵Russia, *Withdrawal from AP I* (2019-10-23), <https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/state-parties/RU>, accessed 2024-12-04.

⁸⁶ Federal Department of Foreign Affairs (FDFA), 413-04-02-01/2019/7056 – GEN 2/19, *Notification to the Governments of the States parties to the Geneva Conventions of 12 August 1949 for the Protection of War Victims ADDITIONAL PROTOCOL I. Withdrawal of a declaration by the Russian Federation*, Geneva, 2019-10-23.

⁸⁷ AP I 1977, n 36, art 35(1)(2)(3).

⁸⁸ Christer Ahlström et.al, n 76, p 23.

⁸⁹ AP I 1977, n 36, art 36.

development (development of prototypes and testing), and...before entering into the production contract.”⁹⁰

Article 35 and 36 of AP I have established that Means or Methods of Warfare are not unlimited. In the employment of an attack the fundamental IHL principle of distinction is stated in article 48:

“...Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.”⁹¹

Further, the civilian population shall enjoy general protection against dangers arising from military operations, and civilian population and civilian individuals shall not be objects of attack, unless directly participating in the hostilities. Indiscriminate attacks are prohibited when not directed at specific military objectives, or when employment of Means or methods of combat cannot be directed at specific military objectives, or the effects of such attacks, cannot be limited without making distinction between military objectives and civilians or civilian objects.⁹² On the fundamental IHL principle of Military Necessity, attacks by bombardment military objectives should be clearly separated in areas containing civilians and civilians objects, with consideration of loss of civilian life, injury to civilians, damage to civilian objects or in a combination which would be excessive to the concrete and direct military advantage,⁹³ which relates to the fundamental IHL principle of proportionality. Reprisals on civilian population is prohibited, and also prohibits attempts to shield military objectives from attacks by directing the attacks on the movement of civilian population.⁹⁴ Also a general protection of civilian objects are articulated and prohibiting civilian objects being targeted or effected by reprisals.⁹⁵ Attacks are strictly limited to military objectives and military objectives are limited by their, nature, location, purpose in effective contribution to military action and if destroyed partially or totally would offer a definite military advantage. In case of doubt before an attack it shall be presumed that the target is unlawful and considered protected as a civilian or a civilian object.⁹⁶ As the fundamental IHL principle of

⁹⁰ ICRC, *A Guide to The Legal Review of New Weapons, Means and Methods of Warfare; Measures to Implements Article 36 of Additional Protocol I of 1977*, Geneva, 2006, p 23.

⁹¹ AP I 1977, n 36, art 48.

⁹² Ibid, art 51(1)(2)(3)(4)(a)(b)(c).

⁹³ Ibid, art 51(5)(a)(b).

⁹⁴ Ibid, art 51(6)(7).

⁹⁵ Ibid, art 52(1).

⁹⁶ Ibid, art 52(2)(3).

precaution in attacks, constant care to spare the civilian population, such as the consideration of planning and decision, to do everything feasible to verify objectives constituting the test for a legitimate military target,^{97 98} and to take feasible precaution in choice of means and methods of attack in avoiding, minimizing incidental loss of civilian life and damage to civilian objects. The refrainment from launching attacks which may result in incidental loss of civilian life and damage to civilian objects that would be excessive to the military advantage expected. Therefore, cancelling an attack if new information reveals that an objective appears as no military objective is an obligation of the attacker. Effective warnings are necessary if an attack may affect the civilian population,⁹⁹ and if possible, deciding between multiple military objects, choose the military object with least effect on civilian population.¹⁰⁰

“...In the conduct of military operations at sea or in the air, each Party to the conflict shall...take all reasonable precautions to avoid losses of civilian lives and damage to civilian objects.”¹⁰¹

In short. Ukraine has made no reservation to AP I and even though Russia has withdrawn from AP I they are still obligated by the fundamental IHL principles, which is found in other legal scopes of IHL. Thermite UAS in relation to AP I is the consideration of fundamental IHL principles when deployed in a military operation.

3.2 Certain Conventional Weapons

3.2.1 CCW

The CCW convention and its protocols are a concise overview of prohibitions and restrictions of conventional weapons under IHL.¹⁰² They aim to provide more detailed and specific guidance on already existing IHL obligations. Such as, impacts on the natural environment, intended designs of weapon systems to have a certain effect, under what specific purposes a system operates, attacks against military objectives in vicinity of civilians or civilian objects, provision of certain conditions and geographical scope and certain means of deployment (air-to-air and air-to-ground). The CCW relies on the fundamental IHL principles of; humanity,

⁹⁷ AP I 1977, n 36, art 57(1)(2)(a)(i).

⁹⁸ Christer Ahlström et.al, n 76, p 17–18.

⁹⁹ AP I 1977, n 36, art 57(2)(a,ii,iii)(b)(c).

¹⁰⁰ Ibid, art 57(3).

¹⁰¹ Ibid, n 36, art 57(4).

¹⁰² United Nations Office of Disarmament Affairs (UNODA), *The Convention on Certain Conventional Weapons* (2024-09-27), <https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons>, accessed 2024-09-27.

distinction, proportionality, military necessity, precautions in attack and most importantly on the protection from SiRUS.¹⁰³ The CCW applies to certain conventional weapons, which means weapons other than mass destruction.¹⁰⁴ Article 1 (1) and (2) apply to both IAC's and NIAC's as referred in common articles 2 and 3 of the Geneva Conventions 1949.¹⁰⁵ The aim of CCW is to protect civilians against the effects of hostilities and to protect combatants from SiRUS. The preamble of the convention restricts what type of effects are allowed and that Means and Methods of Warfare are not unlimited, but also restrictions on Means and Methods severely damaging the natural environment. Lastly the preamble. specifies the need to continuing codification and progressive development.^{106 107} Parties to this convention may propose amendments to any annexed protocol and propose additional protocols to other categories of conventional weapons not covered by existing CCW.^{108 109}

*“New protocols or amendments are “motivated” by a humanitarian desire to prevent developments in technology which are foreseen as posing unacceptable risks against which legal provision is seen by the international community of states to be appropriate.”*¹¹⁰

Within the United Nations Office for Disarmament Affairs¹¹¹ (UNODA) CCW has developed its codification since 1980, with the possibility of negotiating new protocols addressing emerging weapons.¹¹²

*“At any time after the entry into force of this Convention any High Contracting Part may propose additional protocols relating to other categories of conventional weapons not covered by the existing annexed Protocols...”*¹¹³

¹⁰³ Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons (GGE), *Report of the 2022 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons*, CCW/GGE.1/2022/CRP.1/Rev.1, Geneva, 2022-07-29, p 2-3.

¹⁰⁴ Stuart Casey-Maslen, Tobias Vestner, *A Guide to International Disarmament Law*, New York, NY, Routledge, 2019, p 28.

¹⁰⁵ Common articles 2 and 3 of the **Convention (I)** for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field. Geneva, 12 August 1949, **Convention (II)** for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea. Geneva, 12 August 1949, **Convention (III)** relative to the Treatment of Prisoners of War. Geneva, 12 August 1949, **Convention (IV)** relative to the Protection of Civilian Persons in Time of War. Geneva, 12 August 1949,

¹⁰⁶ CCW/GGE.1/2022/CRP.1/Rev.1, n 103, p 4.

¹⁰⁷ Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III). Geneva, 10 October 1980, *Preamble*.

¹⁰⁸ CCW 1980, n 31, art 8(1)(a), 8(2)(a).

¹⁰⁹ CCW/GGE.1/2022/CRP.1/Rev.1, n 103, p 3.

¹¹⁰ William Boothby, n 29, p 109.

¹¹¹ United Nation General Assembly (UNGA), *Renewing the United Nations: A Programme for Reform*, A/51/950, 1997.

¹¹² UNODA, n 2.

¹¹³ CCW 1980, n 31, art 8(2)(a).

Both Ukraine¹¹⁴ and Russia¹¹⁵ has signed and ratified the CCW. None of them has made any reservations to this convention.

3.2.2 Group of Governmental Experts

The Group of Governmental Experts (GGE)¹¹⁶ is a group within CCW that analyzes emerging technologies in the arena of Lethal Autonomous Weapons (LAWS).¹¹⁷ For example the GGE has agreed on that IHL applies fully to all weapons, such as Thermite and UAS hence the connection to LAWS. Humans are the ultimate decision-makers, making humans obligated to take accountability and responsibility for deployment of weapons. Also, when analyzing a new weapon system, such as LAWS, the operational context, its characteristics, and capabilities should be considered.¹¹⁸ Even ICRC has invested its engagement within GGE in relation to IHL.¹¹⁹ Further the GGE advises on non-proliferation, risk-assessments, and mitigation in emerging technologies. Since 2017 the focus of GGE has shifted from conventional weapons towards the analysis on LAWS and its challenges within the scope of CCW.¹²⁰ GGE has formulated a principle on the question of “sufficient human control”. This principle considers two variables. First, the LAWS capabilities and second, the operational context. These two variables will result in different demands on what degree of “sufficient human control” is needed in different situations.¹²¹ This is the rationale behind why CCW Protocol III is important in relation to Thermite UAS. Because the UAS raises the question of “sufficient human control” and Thermite raises the question of operational context of possible SiRUS.

3.2.3 CCW Protocol III:

The preamble confirms the protection of the natural environment from unjustified use of incendiary weapons. It also confirms the Marten Clause.¹²² The basics of Protocol III is the

¹¹⁴ Ukraine, *High Contracting Parties and Signatories CCW* (2024-11-24), <https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons/high-contracting-parties-and-signatories-ccw/>, accessed 2024-11-24.

¹¹⁵ Russia, n 114.

¹¹⁶ GGE, *Examples of existing CCW Protocols*, CCW/GGE.1/2024/CRP.2, Geneva, 4-8 March 2024 and 26-30 August 2024, <https://meetings.unoda.org/ccw-/convention-on-certain-conventional-weapons-group-of-governmental-experts-on-lethal-autonomous-weapons-systems-2024>, accessed, 2024-11-24.

¹¹⁷ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 1.

¹¹⁸ Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System Geneva, 25–29 March 2019 and 20–21 August 2019, *Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems; CCW/GGE.1/2019/3*, 2019, p 4.

¹¹⁹ Christer Ahlström et.al, n 76, p 28.

¹²⁰ Ibid, p 34.

¹²¹ Ibid, p 22.

¹²² Ibid, p 4 and 19.

articulated prohibition of incendiary weapons and its intended design to set fire to objects or cause burn injuries. The key obligation of the convention is the prohibition on making civilians the object of attack by incendiary weapons, under all circumstances.¹²³

*“Incendiary weapon” means any weapon or munition which is primarily designed to set fire to objects or to cause burn injury to persons through the action of flame, heat, or combination thereof, produced by a chemical reaction of a substance delivered on the target.”*¹²⁴

Article 1 defines the purpose design and process to achieve those effects of what incendiary weapons are. It also gives examples of incendiary weapons, such as phosphor and napalm. The GGE stresses that the examples in article 1(1)(a) are just examples, again the intended design is the most important aspect.¹²⁵ Further CCW defines concentration of civilians, military objectives, civilian objects, and feasible precautions. The CCW definition of which weapons are excluded is what makes the deployment of Thermite UAS in The War interesting.

Article 1(1)(b) states that:

*“...Munitions designed to combine penetration, blast or fragmentation effects with an additional effect, such as...similar combined-effects munitions in which the incendiary effect is not specifically designed to cause burn injury to persons, **but to be used against military objectives, such as armored vehicles, aircraft and installations or facilities.**”*¹²⁶

This means according to CCW that to launch a Thermite strike the military action whether the military objects by their purpose, location, and nature and at the time effectively contributes to the enemy, by that offering a definite military advantage. Feasible precautions explain considerations in operational planning. Weighing in on practical action at the time with respect for humanitarian issues.¹²⁷ CCW also highlights another important aspect, that civilians and civilian objects are not always “fixed entities.” Consider the fact of infrastructural transportation of individuals in and out of an area. For example, civilians transporting themselves on a public highway from one Ukrainian town to the next and by

¹²³ UNODA, n 102, *What are the key obligations of State Parties?* (2024-12-07),

<https://disarmament.unoda.org/the-convention-on-certain-conventional-weapons>, accessed 2024-12-07.

¹²⁴ CCW Protocol III 1980, n 107, art 1.

¹²⁵ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 10.

¹²⁶ CCW Protocol III 1980, n 107, art 1(1)(b)(ii).

¹²⁷ *Ibid*, art 1(3)(5).

these movement crosses into military areas.¹²⁸ Further article 1 ensures definitions on concentration of civilians, military objective, civilians' objects and feasible precautions.¹²⁹ The rationale behind these subparagraphs are to align with IHL found in AP I and CIHL.¹³⁰ Article 1(1) is also recognized by the GGE as CIHL rule 84.¹³¹ ¹³² Article 2 deals with prohibitions and restrictions on deployment of incendiary weapons on civilians and civilian objects.¹³³ No civilian or civilian object may never be attacked with incendiary weapon with no exceptions to this rule.¹³⁴ According to GGE article 2 is based on the fundamental IHL principle of distinction and applies to AP I¹³⁵ and CIHL.¹³⁶

*“It is **prohibited in all circumstances** to make any **military objective** located within a **concentration of civilians** the object of **attack by air-delivered incendiary weapons**.”¹³⁷*

Although civilians and civilian objects are protected, there is a difference in the term concentration. Article 2(2) articulates that the concentration of civilians is based on three cumulative conditions. First no air deliverance, second the military objective is clearly separated from concentration of civilians, third all feasible precautions upon attack has been taken.¹³⁸ This section was developed through agreement with clarification on what incendiary weapons are and what they are not.¹³⁹ ¹⁴⁰ Article 2(3) describes the protection of civilians and civilian objects and prohibitions on attacking civilians and civilian objects with incendiary weapons. It is prohibited to strike military targets if civilians and civilians objects at that time could have been avoided.

*“...**except when such military objective is clearly separated from the concentration of civilians** and all feasible precautions are taken with a view to **limiting the incendiary**”*

¹²⁸ CCW Protocol III 1980, n 107, art 1(2)(4).

¹²⁹ Ibid, art 1(2)(3)(4)(5).

¹³⁰ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 10.

¹³¹ Ibid, p 9-11.

¹³² Customary IHL, Rule 84, *The Protection of Civilians and Civilian Objects from the Effects of Incendiary Weapons* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule84>, accessed 2024-12-07.

¹³³ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 9-11.

¹³⁴ CCW Protocol III 1980, n 107, art 2(1).

¹³⁵ AP I 1977, n 36, art 48, 51, 52.

¹³⁶ Customary IHL, Rule 1 *Principles of Distinction between Civilians and Combatants*, Rule 7 *The Principle of Distinction between Civilian Objects and Military Objectives*, Rule 11 *Indiscriminate Attacks* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1>, accessed 2024-12-07.

¹³⁷ CCW Protocol III 1980, n 107, art 2(2).

¹³⁸ Ibid, art 2(3).

¹³⁹ CCW1980, n 31, art 1.

¹⁴⁰ Hays Parks, *Means and Methods of Warfare*, *The George Washington International Law Review*, Volume 38 number 3, Washington DC, 2006, p 522-523.

effects to the military objective and to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects."¹⁴¹

The purpose of article 2(3) is to uphold the fundamental IHL principles of military necessity and humanity,^{142 143 144} but also the principles of distinction, proportionality, SiRUS.¹⁴⁵ This article constitutes what clear separation from concentration from civilians is and this judgement is left for military commanders¹⁴⁶ Also it is prohibited destroying the natural environment just for the sake of "clearing vegetation". For instance, if the vegetation conceals military targets, then the targeted strike could be argued lawful.^{147 148} Article 2 of the CCW is also recognized in AP I¹⁴⁹ and CIHL¹⁵⁰. ICRC also ensures the definitions on incendiary weapons in accordance with CCW Protocol III article 1 and 2.¹⁵¹ In short. Thermite is excluded from the definition of incendiary weapons against military targets, in the CCW Protocol III. However, if there is a violation of the fundamental IHL principles, one could argue that a Thermite UAS strike would be unlawful as an incendiary weapon according to CCW Protocol III. However, during negotiations in the GGE session from 2017, attempts were made to expand the protection of combatants being targeted by incendiary weapons, as in other similar protocols. For example the prohibition against weapons of non-detectable munitions which causes injuries by fragmentation makes combatants protected under Protocol I.¹⁵² Protocol II includes the civilian population, UN-troops and UN-delegations.¹⁵³ Protocol IV and Laser Blinding weapons includes all combatants and civilians.¹⁵⁴ However, Protocol III only includes the civilian population.^{155 156} During the negotiations no consensus or

¹⁴¹ CCW Protocol III 1980, n 107, art 2(3).

¹⁴² Hague Convention 1907 (IV), n 35, art 23.

¹⁴³ GC III 1949, n 105, art 19.

¹⁴⁴ AP I 1977, n 36, art 57(c).

¹⁴⁵ Ibid, art 48.

¹⁴⁶ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 11.

¹⁴⁷ CCW Protocol III 1980, n 107, art 2(4).

¹⁴⁸ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 10.

¹⁴⁹ AP I 1977, n 36, art 55.

¹⁵⁰ Customary IHL, Rule 43 *Application of General Principles on the Conduct of Hostilities to the Natural Environment*, Rule 44 *Due Regard for the Natural Environment in Military Operations*, Rule 45 *Causing Serious Damage to the Natural Environment* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1>, accessed 2024-12-07.

¹⁵¹ Frédéric de Mulinen, *Handbook on the Law of War for Armed Forces*, ICRC, Geneva, 1987, para 931–935.

¹⁵² CCW Protocol I 1980, *on non-detectable fragments*.

¹⁵³ CCW Protocol II 1980, *prohibiting Mines, booby-traps and Other Devices*.

¹⁵⁴ CCW Protocol IV 1980, *on Blinding Laser Weapons*.

¹⁵⁵ CCW Protocol III 1980, n 107.

¹⁵⁶ Lieber Institute, *Articles of war Ukraine symposium Dragon Drones and the Law of Armed Conflict* (2024-12-08), West Point, NY, <https://lieber.westpoint.edu/dragon-drones-law-armed-conflict/>, accessed 2024-12-08.

agreement could be reached on total prohibition on the use of incendiary weapons on combatants.¹⁵⁷

*“Protocol III may offer indirect protection to combatants when they are in proximity to a concentration of civilians but in general does not protect combatants from the effects of incendiary weapons.”*¹⁵⁸

3.3 CIHL

CIHL recognizes state practice in the way of:

*“.. It is generally agreed that the existence of a rule of customary international law requires the presence of two elements, namely State practice (usus) and a belief that such practice is required, prohibited or allowed, depending on the nature of the rule, as a matter of law (opinio juris sive necessitatis).”*¹⁵⁹

In 1970 the United Nations General Assembly (UNGA) had a discussion on the use of incendiary weapons. Incendiary weapons were a sensitive issue, especially due to the Vietnam War raging at the time. Even though the matter was sensitive, a resolution was adopted in 1972 on disarmament.

*“...Conscious that incendiary weapons have always constituted a category of arms viewed with horror...considered napalm bombing to be among the methods and means that erode human rights. Noting that complete proposals for both elimination and non-use of incendiary weapons were advanced at the disarmament negotiations in 1933 and that proposals have recently been made to prohibit or restrict their use.”*¹⁶⁰

There are two rules within CIHL that specifically regulate incendiary weapons. Rule 84 protects civilians and civilian objects from the effects of incendiary weapons, it states that:

*“If incendiary weapons are used, particular care must be taken to avoid, and in any event minimize, incidental loss of civilian life, injury to civilians and damage to civilian objects.”*¹⁶¹

¹⁵⁷ Christer Ahlström et.al, n 76, p 18–19.

¹⁵⁸ CCW/GGE.1/2022/CRP.1/Rev.1, 2022, n 103, p 11.

¹⁵⁹ ICRC, *Assessment of Customary IHL* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1/in>, accessed 2024-12-07.

¹⁶⁰ UNGA, Res. 2932 A (XXVII), 29 November 1972, preamble and §§ 1–3, voting record: 99-0-15-18.

¹⁶¹ Customary IHL, Rule 84, *The Protection of Civilians and Civilian Objects from the Effects of Incendiary Weapons*, n 132.

State practice establishes this rule as a norm of CIHL applicable in both international and non-international armed conflicts.¹⁶² Rule 84 refers especially to CCW Protocol III.¹⁶³ ¹⁶⁴

Ukraine's IHL Manual (2004) states that the following means of warfare is prohibited: Incendiary weapons directed against the civilian population or civilian objects as well as forests or other kinds of plant cover unless the use of such weapons is covered by cases indicated in the Primary Requirements of CCW Protocol III.¹⁶⁵ The manual further states:

*“If combat is conducted in the forest, it is necessary to take into account the probability of forest fires that are likely to endanger persons and objects protected by international humanitarian law.”*¹⁶⁶

The Russian Federation's Regulations on the Application of IHL (2001) states:

“The following shall be prohibited to use in the course of combat operations: ... incendiary weapons in all circumstances against the civilian population and civilian objects, as well as when used to destroy forests or other kinds of plant cover, except when such natural elements are used by the enemy for military purposes.” ¹⁶⁷

Rule 85 regulates the use of incendiary weapons against combatants, it states that:

*“The anti-personnel use of incendiary weapons is prohibited, unless it is not feasible to use a less harmful weapon to render a person hors de combat.”*¹⁶⁸

State practice establishes this rule as a norm of CIHL applicable in both IAC and NIAC.¹⁶⁹

The link between CCW and CIHL is the fact that CCW got adopted by consensus. This is the reason why the term combatant was left out in the CCW. However, as ICRC declares, this exclusion should not be understood that incendiary weapons are lawful under all circumstances.¹⁷⁰ Many states' military manuals have restricted their use of incendiary weapons only to “military objects” such as armored protection and fortifications. Ukraine's IHL Manual doesn't mention Rule 85 at all. However, The Russian Federation does. At the

¹⁶² Customary IHL, Rule 84, *Summary*, n 132.

¹⁶³ CCW Protocol III 1980, n 107, art 1(1)(a)(b)(i)(ii), art 1(5), art 2(1)(2)(3)(4).

¹⁶⁴ Customary IHL, Rule 84, *International Armed Conflicts*, n 132.

¹⁶⁵ Ukrainian Ministry of Defence, *Manual on the Application of IHL Rules of International Humanitarian Law in the Armed Forces of Ukraine Manual Order 400*, Kyiv, 2004, art 1.3.3.

¹⁶⁶ Ukrainian Ministry of Defence, *Manual on the Application of IHL Rules of International Humanitarian Law in the Armed Forces of Ukraine Manual Order 400*, Kyiv, 2004, art 1.3.3.

¹⁶⁷ Russian Federation, *Regulations on the Application of IHL Manual on International Humanitarian Law for the Armed Forces of Russian Federation*, Moscow, 2001, art 9.

¹⁶⁸ Customary IHL, Rule 85, *The Use of Incendiary Weapons against Combatants* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule85>, accessed 2024-12-07.

¹⁶⁹ Customary IHL, Rule 85, *Summary*, n 168.

¹⁷⁰ Customary IHL, Rule 85, *International Armed Conflicts*, n 168.

International Conference on the Protection of War Victims in 1993, the Russian Federation declared:

*“In order to protect the civilian population against indiscriminate weapons ... incendiary weapons ... should be completely banned in internal conflicts.”*¹⁷¹

State practice under Rule 85 is three folded. First, several states have specified that incendiary weapons are restricted in their use on combatants under armored protection or fortifications. Second, that incendiary weapons may not be used against combatants in a way that would cause SiRUS. Third, several military manuals prohibit incendiary weapons on combatants because they cause SiRUS.¹⁷² In short, CIHL and its relation to Thermite UAS are through the recognized state practice on incendiary weapons. Ukraine and Russia have articulated in their respective IHL manuals restrictions and prohibitions on certain conduct in the deployment of Thermite.

4. Discussion

4.1 Observations from The War

During The War, several observations have been made in relation to Thermite UAS and their deployment on the battlefield. According to a 2024 report from The Institute for the Study of War (ISW) the development of UAS and new weapons attached to the DJI platforms have been a well observed characteristic in The War.¹⁷³ ISW’s conclusions are that deploying UAS sufficiently requires imagination, innovation, and iteration. Innovation has been the key driving factor for Ukraine in The War to survive the Russian aggression. The rationale behind this is that Ukraine’s scarce resources can’t match Russia’s overwhelming manpower and natural resources. And this was the reason why Ukraine choose quality over quantity.¹⁷⁴ Another argument for quality and automatization is to free military personnel for other more sophisticated tasks. Future automatization will make it possible for one operator to pilot several systems at the same time.¹⁷⁵ UAS can provide stealth and reconnaissance over large areas using fewer soldiers as operators thus being more effective with their resources. UAS also provides precision targeting. Countermeasures from UAS strikes have been taken on both

¹⁷¹ Russian Federation, *Statement at the International Conference for the Protection of War Victims*, Geneva, 30 August–1 September 1993.

¹⁷² Christer Ahlström et.al, n 76, p 24.

¹⁷³ Institute for the Study of War, n 46, p 11.

¹⁷⁴ Ibid, p 67.

¹⁷⁵ Christer Ahlström et.al, n 76, p 9.

sides, in enhancing Electronic Warfare capabilities (EW) such as signal jamming and GPS-jamming. UAS has also been used as an air-to-air missile defense system and as an air-to-ground system destroying enemy air defense systems also known as Counter Unmanned Aircraft systems (C-UAS).¹⁷⁶ The concept of swarming, when few operators pilot many UAS's, has been reported in offensive operations on both sides but it is unclear how successful these strikes have been. In the analyzed material it has been observed that the UAS's are able to fly into open main battle tank hatchets and open backdoor ramps on armored personnel carriers. The UAS is able to knock on the enemy's door.¹⁷⁷

In the case of Ukrainian deployment of Thermite UAS some observations have been made. All of the analyzed strikes have been deployed on the battlefield of eastern Ukraine. The material has been uploaded by the Ukrainian units themselves. The material has been, as earlier mentioned, confirmed by Ukraine Defense Ministry. Also, the Thermite strikes have been confirmed by Russian units either by ground-to-air or in after-action material. No relevant Russian Thermite UAS strike video material have been analyzed further since no Russian Thermite UAS strike against Ukrainian forces has been confirmed as of November 2024. The Russians are concluded to be in a testing and development phase. The following observations derive from four verified Ukrainian Thermite UAS strikes, (1) 92nd Assault Brigade of Operational Command East with headquarters in (HQ) in Kharkiv Oblast,¹⁷⁸ (2) 42nd Mechanized Brigade of Operational Command South with HQ in Mykolaiv Oblast,¹⁷⁹ (3) 108th Separate Territorial Defense Brigade of Territorial Defense Forces with HQ in Dnipropetrovsk Oblast,¹⁸⁰ (4) 116th Mechanized Brigade of 10th Operational Corps with HQ in Poltava Oblast.¹⁸¹ Geographically these strikes have taken place in the eastern parts of Ukraine along the frontline of the Kharkiv-Poltava-Dnipro-Mykolaiv axis. The topography is flat with fertile steppes and minor height differences of 100m. The Dnipro River creates a smaller valley in the vicinity of the river from north to south. Large open fields spread through the region with minor vegetation irregularly sprinkled over the landscape. The

¹⁷⁶ JAPCC, n 49, p 6-7.

¹⁷⁷ Institute for the Study of War, n 46, p 11.

¹⁷⁸ Defense of Ukraine, "Dragon" drones in action (2024-09-24), <https://x.com/DefenceU/status/1838647589358432422>, accessed 2024-12-07).

¹⁷⁹ Defense of Ukraine, A "dragon drone" in the Kharkiv direction (2024-09-04), <https://twitter.com/DefenceU/status/1831312003404865561>, accessed 2024-09-21.

¹⁸⁰ MilitaryNewsUA, Ukrainian FPV drone burns Russian positions with thermite (2024-09-02), https://x.com/front_ukrainian/status/1830550497452757350, accessed 2024-12-07.

¹⁸¹ NOELREPORTS, Khorne Group within the 116th Mechanized Brigade demonstration the new dracarys drone, dropping flammable substances over Russian positions (2024-09-05), <https://x.com/NOELreports/status/1831775791551803666>, accessed 2024-12-07.

vegetation consists of groves, hedgerows, minor forests and planted tree lines.¹⁸² The forests and tree lines are the only reasonable places for soldiers to take defensive positions, making these areas key terrain for any military force since it provides concealment. No large spread of forest fires has been observed that could cause damage to the natural environment, at least no more damage that has already been done by other conventional weapons. The fires have only been observed close to actual sites of a Thermite UAS strike. All observed material has taken place outside cities. No concentration of civilians or civilian objects has been observed. At the same time when analyzing this material, it is also unreasonable for civilians to be attracted to these key military areas since they provide no civilian infrastructure needed in everyday civilian life. For example, in the 116th Mechanized Brigade video a public highway and a lone building appears in the distance. The highway and the building are not part of the Thermite strike, and no vehicles appeared on the highway, nor could any civilians be observed around the building at the time conducting the strike. We can't tell if the highway and building were sealed off by any force or if the highway and building was used daily or not. However, these civilian infrastructures are the only observation made in all of the analyzed material. In the key areas described above, most forces are fortified in trenches. It is those key areas that are being targeted. Most of the observations are made from one UAS's filming when another UAS Thermite strike is deployed on "potential" targets. The reason behind the wording potential is that very few videos are revealing any Russian soldiers at all. The concealment from the tree lines makes it very hard to observe if Russian soldiers are defending themselves or not. Only in one video Russian tracers are visible showing defensive actions against a Thermite strike. It is impossible from the air to ground material to analyze whether the soldiers on the ground are unable to defend themselves for reasons of lack of resources, or if panic is spread in the trenches or if there are any soldiers on the ground at all. The most reliable OSINT-material that can be assessed is analyzing a mixture of videos from different angles, from air to ground, from ground to air and after-action videos. Some ground-to-air material uploaded by Russian soldiers is showing how they defend themselves from a Thermite strike.¹⁸³ From the ground-to-air angle, it is very hard for the soldiers to observe and destroy any Thermite UAS. The Thermite UAS is potentially moving too fast. It is, however, the after-action videos that have shown the actual result of a Thermite strike. Those

¹⁸² CIA World Fact Book, *Explore All Countries – Ukraine* (2024-12-70), <https://www.cia.gov/the-world-factbook/countries/ukraine/#geography>, accessed 2024-11-27.

¹⁸³ Telegram, *Russian service man records a Dragon Breath drone approaching their position and starting to released thermite, guns shots heard trying to shoot it down but with no avail* (2024-10-09), <https://t.me/TheLeaflet/11860>, accessed 2024-11-27.

videos show the burnt aftermath of destroyed trenches, destroyed equipment but also burnt corpses and human body parts. The after-action material is confirmed by both Ukrainian and Russian Forces.¹⁸⁴ From the material we can't tell how large the defending units have been, and we can't tell how many of those units that has survived or how many soldiers have fallen. We also can't tell if Russian soldiers have been given the chance to give up the fight and enjoy status of prisoners of war (POW). We also can't tell if wounded or sick Russian soldiers were protected from Thermite strikes according to Geneva Conventions (GC). In short, the Ukrainian material released only shows the actual Thermite strikes. The best assessments are made of a mixture OSINT of air-to-ground-, ground-to-air- and after-action videos. The material also excludes civilians or civilian objects being targeted or being concentrated in the vicinity of a Thermite strike.

The Russian observations of Thermite UAS are fewer and simpler. In this case the material suggests that Russian forces have only reached the development phase of testing Thermite UAS. Videos are showing small scale Thermite testing in separated areas with only Russian soldiers around. No material as of November 2024 has been released showing Russian forces being able to conduct Thermite strikes at the same level as the Ukrainians.¹⁸⁵ Analyzing the observation material, it is possible to try and formulate a definition of Thermite UAS. First, Thermite UAS consists of two components. A weapon system with one or more UAS's piloted by one or more operators. Second, a Thermite payload is loaded onto one or more UAS's. Third, Thermite UAS's intended design in The War is to deliver a thermal effect onto a military target, with the purpose of destroying the target or object and/or terrorizing combatants or objects and/or frightening soldiers by injecting fear.¹⁸⁶ In short, the observations suggest that only combatants and military objectives have been targeted with Thermite UAS so far in The War. No concentration of civilians or civilian objects appears to have been targeted. It is unclear to what degree Artificial Intelligence (AI) has been involved in the Ukrainian targeting process. The degree of autonomy is important in order understand the second research question as to Thermite UAS can be viewed as a Natural or a Calculated incendiary weapon.

¹⁸⁴ Telegram, *Russian soldier records the aftermath of the Dragon Breath type drone that releases thermite on tree lines* (2024-09-06), <https://t.me/TheLeaflet/10912>, accessed 2024-11-27.

¹⁸⁵ Telegram, *Dreams didn't make us king dragons did* (2024-09-11), <https://t.me/MedvedevVesti/18575>. Accessed 2024-11-27.

¹⁸⁶ CCW/GGE.1/2024/CRP.2, *II Concise overview of the examples of existing Protocols (7)*, Geneva, 4-8 March and 26-30 August 2024, <https://meetings.unoda.org/ccw-/convention-on-certain-conventional-weapons-group-of-governmental-experts-on-lethal-autonomous-weapons-systems-2024>, Accessed, 2024-11-24, p 2.

4.2 Thermite UAS and LAWS

In 2019 a Swedish IHL disarmament committee (SWE GGE) was assigned to study the question of LAWS. The purpose of the study was to propose effective prohibitions and restrictions on LAWS that were violating existing fundamental IHL principles in relations to CCW. SWE GGE submitted a report in 2020 which provided three perspectives of the continuing in studying LAWS. First, existing IHL is sufficient and other excessive instruments are superfluous. It would require through AP I Article 36 that every new technology needs new and updated IHL regulation. Second, existing law is sufficient to deal with questions on technological progress, but there could be a need for clarification of existing IHL. At the moment clarification would focus on “sufficient human control” in relation to LAWS. This clarification could be presented as a consensus document by the GGE. Third, Existing IHL is not sufficient. LAWS is distinctly different from other weapon systems, hence the need for a new IHL.¹⁸⁷ So how do states view these perspectives? USA, Russia, and China (The Big Three) are the most active states in developing LAWS. All three consider current existing IHL sufficient to deal with questions on LAWS. Sweden has taken the same position as The Big Three with the argument that any restriction or prohibition on LAWS without acceptance from The Big Three would be ineffective.¹⁸⁸ The SWE GGE delegation has noticed that states with resources on developing LAWS tends not to be interested in the process of prohibition and restriction and therefore not taking an active part within the GGE forum. Once a technological development has reached its final stages and a saturation has reached on the market, then, The Big Three tends to get involved on questions of prohibition and restriction.¹⁸⁹ Specific restrictions or prohibitions of LAWS from a military operational perspective may limit the military combat power. Future regulation may limit defensive forces to defend themselves from offensive forces. Such future regulations must be understood in relation to every state’s national interest, such as military strategy, economics and realpolitik.¹⁹⁰ A State potentially impaired ability to defend itself will then affects its citizens affecting every individual within that state.¹⁹¹ The questions on LAWS are a clear indication that the GGE community, as a whole, is ready to further restrict LAWS as a Means of Warfare within CCW in relation to IHL and International Humanitarian Law (IHL).¹⁹² UNODA has

¹⁸⁷ Christer Ahlström et.al, n 76, p 32.

¹⁸⁸ Ibid, p 32.

¹⁸⁹ Ibid, p 30.

¹⁹⁰ Dan Saxon, n 28, 2013, p 339.

¹⁹¹ Christer Ahlström et.al, n 76, p 14.

¹⁹² Ibid, p 31-32.

also called for the need of international standards as a reaction to the notified expanding use of armed UAS.¹⁹³

The author has observed that judging from the analysis of LAWS and CCW there seems to be no specific legal discussion within the GGE or SWE GGE that would help, a categorization of Thermite UAS, as to whether this weapon system falls in under the category of LAWS or as an incendiary weapon. The discussions and analysis of UAS somehow tends to be categorized under LAWS. States seem more interested in analyzing capabilities of Artificial Intelligence (AI). Today's discussion on the use of UAS is very similar to the historical development of artillery. Firing without observing the enemy was argued not to comply with the norms at that moment in history. Methods and rules have developed to make sure that no system is firing beyond line of sight (BLOS).¹⁹⁴ There is however a consensus in GGE that LAWS is regulated within CCW. The question is to what extent since it doesn't change the core of the question on responsibility and accountability. USA and France have criticized the scope of responsibility and accountability in relation to "sufficient human control." More exactly their critique lays in how to consider the demand for remote piloting. The GGE interpretation on remotely piloted UAS in relation to "sufficient human control" is according to USA and France too narrowly defined. USA are today conducting UAS operations globally and they fear that GGE will make it impossible to implement AI into UAS platforms.¹⁹⁵ There has been a suggestion on a new protocol to the CCW on total prohibition on LAWS put forward by Brazil, Chile, and Austria. The side against that proposition has been USA, India, Japan, Australia, Israel, UK, China and EU.¹⁹⁶ Studying LAWS in relation to AI will continue to be important, but at the same time UAS deployment in The War, such as DJI Mavic is not equipped with AI. Observations from The War are clearly suggesting that human operators are still piloting the UAS. SWE GGE propose that some answers for the future could be found in The Hague 1907 article 1¹⁹⁷ and in San Remo Manual art 82¹⁹⁸ Both of them shows the importance of discussion what requirements standards LAWS should be held upon in the

¹⁹³ UN, *The Expanding Use of Armed UAV's and the Need for International Standards* (2018-11-30), <https://disarmament.unoda.org/update/the-expanding-use-of-armed-uavs-and-the-need-for-international-standards/>, accessed 2024-11-17.

¹⁹⁴ Swedish Armed Forces, *Handbook – Army control and command – Reconnaissance and indirect fire*, 2016, p 17.

¹⁹⁵ Christer Ahlström et.al, n 76, p 21.

¹⁹⁶ Ibid, p 28.

¹⁹⁷ The Hague Convention 1907 (IV), n 35, art 1.

¹⁹⁸ San Remo Manual on International Law Applicable to armed Conflicts at Sea, 1994, Art 82,

future, and not to dwell in discussions of definitions or restrictions.¹⁹⁹ This feature of The War is distinctive concerning LAWS in relation to Thermite UAS.²⁰⁰ The author agrees with that:

“...To find a definition that describes the technical capabilities in a way that excludes existing technology but includes future systems has shown to be very hard and probably not possible. States and NGO’s have started using definitions from different perspectives with the focus on how humans control technology rather than understanding the technology itself. Sufficient, meaningful, and human control have instead become concepts where many parties within the international fora can unite around.”²⁰¹

4.3 Thermite UAS and IHL

Boothby states that:

“Means of warfare, are weapons, weapon systems, or platforms employed for the purposes of attack...so means of warfare can be regarded as the equipment used to cause harm to the enemy while methods of warfare are the ways in which hostilities are conducted.”²⁰²

Fleck arrives at the same conclusion as Boothby with slightly different wording.²⁰³ The UN defines UAS as a system which includes one or more UA, with a supporting network, with equipment and personnel to operate the UA.²⁰⁴ Thus, stressing the fact that UAS is a system of one or several platforms with guidance and control links, sensors with one or more human operators. However, even if UAS were truly LAWS equipped with Artificial Intelligence (AI), according to ICRC they are still capable being implemented within IHL,²⁰⁵ since LAWS will still have to comply with AP I art 36.²⁰⁶ A weapon and its technical capabilities must be analyzed from a case-to-case scenario questioning if the act was lawful. From an operational perspective the focus should be on the specific system and its effects in the specific armed

¹⁹⁹ Christer Ahlström et.al, n 76, p 21.

²⁰⁰ Ibid, p 28.

²⁰¹ Ibid (author’s translation), n 76, p 11.

²⁰² William Boothby, *The Handbook of The International Law of Military Operations Chapter 18 Weapons under the Law of Military Operation*, second edition, Oxford University Press, Oxford, 2015, p 333.

²⁰³ Terry Gill, Dieter Fleck, *The Handbook of The International Law of Military Operations*, second edition, Oxford University Press, Oxford, 2015, p 333.

²⁰⁴ United Nations, *Guidelines United Nations Use of Unmanned Aircraft Systems (UAS) Capabilities*, Department of Peace Operations Ref 2019.05, New York, 2019, p 5.

²⁰⁵ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflict; Report Prepared for the 31st International Conference of The Red Cross and Red Crescent*, Geneva, 2011, p 39.

²⁰⁶ API 1977, n 36m Art 36.

conflict.²⁰⁷ Much of the same logic applies on human-to-human combat.²⁰⁸ And for this reason the IHL is different in comparison to Human rights (HR) since the question of weapon and weapon systems is not regulated in HR. HR answers to questions of right to life, prohibition of torture, treatment with dignity. Deadly violence is not prohibited even in HR and combatants in the scope of IHL are lawful military targets.²⁰⁹ Marco Sassoli argues that UAS regardless the degree of automatization everyone understands the example of technical failures in a driving car is mostly due to human error.²¹⁰ The lawfulness of UAS in LOAC stems from the notion that it is an airframe with sensor and therefore falls under AP I art 36.

*“...Accuracy allows to employ munitions with kinetic energy far less than artillery, reducing collateral damage...”*²¹¹

This notion is also confirmed by SWE GGE stating that IHL continues to fully apply on all weapon systems. Humans are responsible, accountable and states should be restrictive to anthropomorphize LAWS, since it cognitively takes away the responsibility from humans.²¹² Further according to SWE GGE, from a technical standpoint, it is impossible and almost irrelevant to differentiate from autonomous and automatic in relation to Thermite UAS. Especially when the trend seems to give UAS anthropomorphous characteristics, such as the term “suicide drones.” This creates confusion of specific system and their capabilities.²¹³ Multi-spectral Targeting Systems (MTS-B) sensors makes UAS well suited for identifying, locating targets on the ground.²¹⁴ There are several reasons for the use of UAS in military operations. Using UAS is a form of risk mitigating for the military personnel. But also, to ramp up efficiency in repetitive and dull moments, such as reconnaissance flight in set loops for a long time.²¹⁵ UAS violations under LOAC are often results of operator misjudgment. Paradoxical technology cannot (yet) compete with combat experienced human judgement.²¹⁶

²⁰⁷ Christer Ahlström et.al, n 76, p 14.

²⁰⁸ Gary Solis, n 69, p 555.

²⁰⁹ Christer Ahlström et.al, n 76, p 15.

²¹⁰ Marco Sassoli, *Autonomous Weapons and International Law: Advantages, Open Technical Questions and Legal Issues to Be Classified*, US Naval War College's International Studies, Vol 90, 2015, p 308.

²¹¹ Gary Solis, n 69, p 550.

²¹² Christer Ahlström et.al, n 76, p 26.

²¹³ Ibid, p 8.

²¹⁴ Barry Schneider, Lawrence MacDonald, *Are Manned or Unmanned Aerial Better on the Battlefield?* Cicero Magazine, 2014, p 1.

²¹⁵ Christer Ahlström et.al, n 76, p 8.

²¹⁶ Hee-Young Ryu, *The Lawfulness of and Case for Combat Drones in the Fight against Terrorism*, National Security Law Journal, 2013, p 12.

²¹⁷ Anderson et.al. raises the question if LAWS should be able to assess civilian status as part of their own independent targeting decisions?²¹⁸ Solis answer that question with:

*“Still given the chances of error, for now distinction remains a process most commanders will want to determine for themselves.”*²¹⁹

DeBrabander argues with objections to LAWS stating that UAS’s has removed the attacker from the battlefield making it easier to inflict violence on the victim.²²⁰ In which Wittes replies, in a replying article, that is it less ethical to use UAS if the strike promises fewer civilian casualties compared to any other weapon systems? Not deploying your own troops on the battlefield appeals to military commanders, as an “exotic oasis mirage”, who at the same time also has responsibility on the wellbeing of the personnel.²²¹ If we were comparing WWII bomber pilots with today’s UAS operators everyone expects the UAS operator to know exactly what target he or she its hitting with an immediate battle damage assessment. Bomber pilots’ precision yesterday are no longer accepted today.²²² The measurable standards of acceptability has shifted.²²³ In relation to Thermite to understand the idea of a weapon you need investigate what the system is critically linked to, the intended use and designed purpose. When you understand the intended design, it is possible to define whether the weapons have defensive or offensive capabilities.²²⁴ Adachi arrives to the conclusion that:

*“In 1980 most countries agreed on principle level on the norm against indiscriminate weapons causing superfluous injuries and unnecessary suffering which led to the CCW.”*²²⁵

Increased precision to decrease unwanted side effects has long been important in military technology development. Automatization, performance, precision, reaction speed as the most important. Effective resource allocation with few operators piloting many systems is a desired

²¹⁷ Gary Solis, n 69, p 551.

²¹⁸ Kenneth Anderson, Daniel Reisner, Matthew Waxman, *Adapting the Law of Armed Conflict to Autonomous Weapons Systems*, Naval War College International Law Studies, Vol 90, 2014, p 386.

²¹⁹ Gary Solis, n 69, p 540.

²²⁰ Firmin DeBrabander, *Drones and the Democracy Disconnect* (2014-09-14), New York Times, <https://archive.nytimes.com/opinionator.blogs.nytimes.com/2014/09/14/drones-and-the-democracy-disconnect/>, accessed 2024-10-19.

²²¹ Benjamin Wittes, *Drones and Democracy; A Response to Firmin DeBrabander* (2014-09-15), Lawfare, <https://www.lawfaremedia.org/article/drones-and-democracy-response-firmin-debrabander>, accessed 2024-10-19.

²²² Gary Solis, n 69, p 554.

²²³ Dan Saxon, n 28, p 348.

²²⁴ William Boothby, n 202, p 332-333.

²²⁵ Kenki Adachi, *Changing Arms Control Norms in International Society; Incendiary Weapons*, Routledge, Abingdon, 2021, p 82.

capability within military operations.²²⁶ Regarding proportionality there are some IHL-obstacles facing Thermite UAS:

“...which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”²²⁷

This notion of AP I will evidentially lead to an asymmetric battlefield.²²⁸ The problem with UAS and LAWS is applying “military advantage anticipated”, Therefore, a machine can’t be left to apply proportionality itself unless humans constantly update the latest operational planning.^{229 230} This is also the main reason why humans are inside the loop with UAS decision-making.²³¹ According to GGE a decision can’t be handed over to a machine by a human. Humans are regardless responsible for the effects of the weapon system. LAWS has to be reliable in order for the UAS operator make a well assessed decision regarding anticipated effects and be able to take precautionary actions before a strike in accordance with IHL.²³² Saxon describes this process as examination on the intention of planning as well as evaluation of the consequences.²³³ There are some differences in IAC’s and NIAC’s when deploying UAS’s. In a NIAC the decision-maker needs confirmed positive identification (PID) before striking a military target.²³⁴ In IAC’s the opposing combatant are lawfully military targets with no further discussion. Regardless of whether an IAC or NIAC the fundamental IHL principles still has to be considered. Weapon systems are regulated in international law. The commander authorizing LAWS will do that with sufficient consideration in accordance with IHL. The question of responsibility in military operations is the standard operating procedure that runs through the military chain of command. The military commander of the targeting state may authorize a targeted strike. However, the rank of the military commander is not specified.²³⁵

²²⁶ Christer Ahlström et.al, n 76, p 13.

²²⁷ API 1977, n 36, art 51(5)(b) and art 57(2)(a)(ii)

²²⁸ Gary Solis, n 69, p 540.

²²⁹ Marco Sassoli, *International Humanitarian Law; Rules, Controversies, and Solutions to Problems Arising in Warfare*, Edward Elgar Publishing, Cheltenham, 2019, p 322.

²³⁰ API 1977, n 36, art 57.

²³¹ Gary Solis, n 69, p 541.

²³² Christer Ahlström et.al, n 76, p 22.

²³³ Dan Saxon, n 28, p 343.

²³⁴ Customary IHL, Rule 16 *Target Verification* (2024-12-07), <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule16>, accessed 2024-12-07.

²³⁵ Gary Solis, n 69, p 560.

4.4 Conclusions

This thesis has come to three conclusions. The first conclusion argues that Thermite UAS could be deployed lawfully and unlawfully. It is lawful to conduct a strike against military targets such as combatants, armored vehicles, and fortifications according to fundamental IHL principles, CCW and CIHL. However, it is unlawful according to CIHL to cause SiRUS on combatants if a less harmful weapon is available at the time of the strike. This exposes a gap between CCW and CHIL. In relation to observations from The War, Ukrainian Thermite UAS is argued to have been deployed lawfully, with distinction of no concentration of civilians or civilian objects and only directed at military targets. Whether less harmful weapons were available at the time of the four verified Ukrainian strikes is inconclusive at the moment.

The second conclusion argues that the current framework of fundamental IHL principles, CCW and CIHL is still sufficient to answer the question of legality on deployment of Thermite UAS in The War. The author argues, with reference to SWE GGE, Sassoli and Boothby, that there is no further need for legal development within CCW or CIHL because, the military commander is still responsible for the operational planning and giving the orders to deploy all weapon systems regardless of incendiary weapons or LAWS. The military commander is always obligated in the decision-making on how the decisions will impact the fundamental IHL principles in relation to military targets. As Saxon expresses it, how IHL principles will be considered, are being considered or have been considered is essential within every military operation. The author argues this line of reasoning, with reference to The Lieber Institute, that each proposed military target raises its own unique moral dilemmas at that specific time.

On the third conclusion the author argues that at the tactical level Thermite UAS gives the attacking force a great military advantage. The ability to reduce enemy concealment and precisely destroy almost any military target is always preferable for a military commander. It is not unlawful, with distinction, to deploy Thermite on combatants nor is it unlawful to inject fear, which is the nature of war, which is also recognized under IHL, CCW and CIHL. However, at the operational level the author argues that Thermite UAS has less military advantage. If the advantage of a Thermite Strike is not directly exploited it is questionable whether the strike was necessary from the beginning, with the true intention to inject fear and cause deterrence on Russian forces. At the strategic level, the author is sceptic whether Thermite UAS gives any military advantage except deterrence by communicating that the capability is realistic and can be deployed in the future with greater tenacity. If Thermite UAS

somehow could conduct strikes on military targets deep into Russian territory thus destroying the command-and-control ability or harming logistical capabilities at Russian brigade or divisional level, then this weapon system would give the strategical military advantage anticipated. The future will tell whether Thermite UAS will give those strategical advantages, maybe as soon as in the summer of next year 2025.

5. Summary

5.1 Answering the questions

The first question was:

1. *Whether Thermite UAS weapons, as a means of warfare are or may be incendiary weapons and if so, when may they be covered by CCW Protocol III?*

Thermite UAS weapons are not incendiary weapons solely because of their existence. Thermite is excluded in CCW Protocol III article 1 as a defined incendiary weapon, as such, and therefore not covered by the protocol.

“...but to be used against military objectives, such as armored vehicles, aircraft and installations or facilities.”²³⁶

However, Thermite UAS may be an incendiary weapon depending on how targets get selected, or not selected! The intended design of Thermite UAS could cause incendiary effects. In that case they may then be covered by CCW if the fundamental IHL principles are proven violated. Following this line of reasoning it is possible to argue that Thermite UAS are unlawful according to CCW Protocol III.

The second question was:

2. *Whether Thermite UAS weapons, in the Ukraine War, as a means of warfare can be considered "natural" or "calculated" to cause superfluous injury and unnecessary suffering under Customary International Humanitarian Law?*

The chemical reaction is Natural in itself, once the ignition starts, the chemical reaction cannot be stopped. However, the Thermite strike itself is argued, to be calculated due to the command-and-control ability of the operator. Before the ignition, the operator is in total control of the weapon system. The operator moves the UAS into a strike position and then

²³⁶ CCW Protocol III 1980, n 107, art 1(1)(b) (ii).

sets off the Thermite, therefore being in total control of the striking sequence. The deployment of Thermite can therefore be considered Calculated due to the UAS ability to precisely strike a lawful military target and the ability to abort a mission by piloting away from the scene at any time if a protected category was wrongfully targeted. The observation material reveals that only military targets such as combatants, armored vehicles and field fortifications have been targeted with Thermite UAS in The War. Due to the ability of the operator to Calculate the Thermite's built-in chemical characteristics, Thermite UAS may cause SiRUS on combatants. What determines the lawfulness under fundamental IHL principles, CCW and CIHL is, if and how a targeting process were conducted and how well the operational planning took fundamental IHL principles into consideration at the moment of the actual time and place of the Thermite strike. Depending on the assessment of military advantage gained from a Thermite strike it is important to balance the military necessity versus humanity in that specific military operation, due to the unique circumstances.

*“Any lawful weapon can be applied unlawfully.”*²³⁷

5.2 Continued research

This thesis is one of the first of its kind analyzing Thermite UAS in The War. Obviously, future research should focus on case studies drawn from more observations of The War. Another interesting research would be to conduct a comparative study of how different states would align or not in deploying Thermite UAS if they had the ability in an armed conflict.

²³⁷ Gary Solis, n 69, p 543.

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