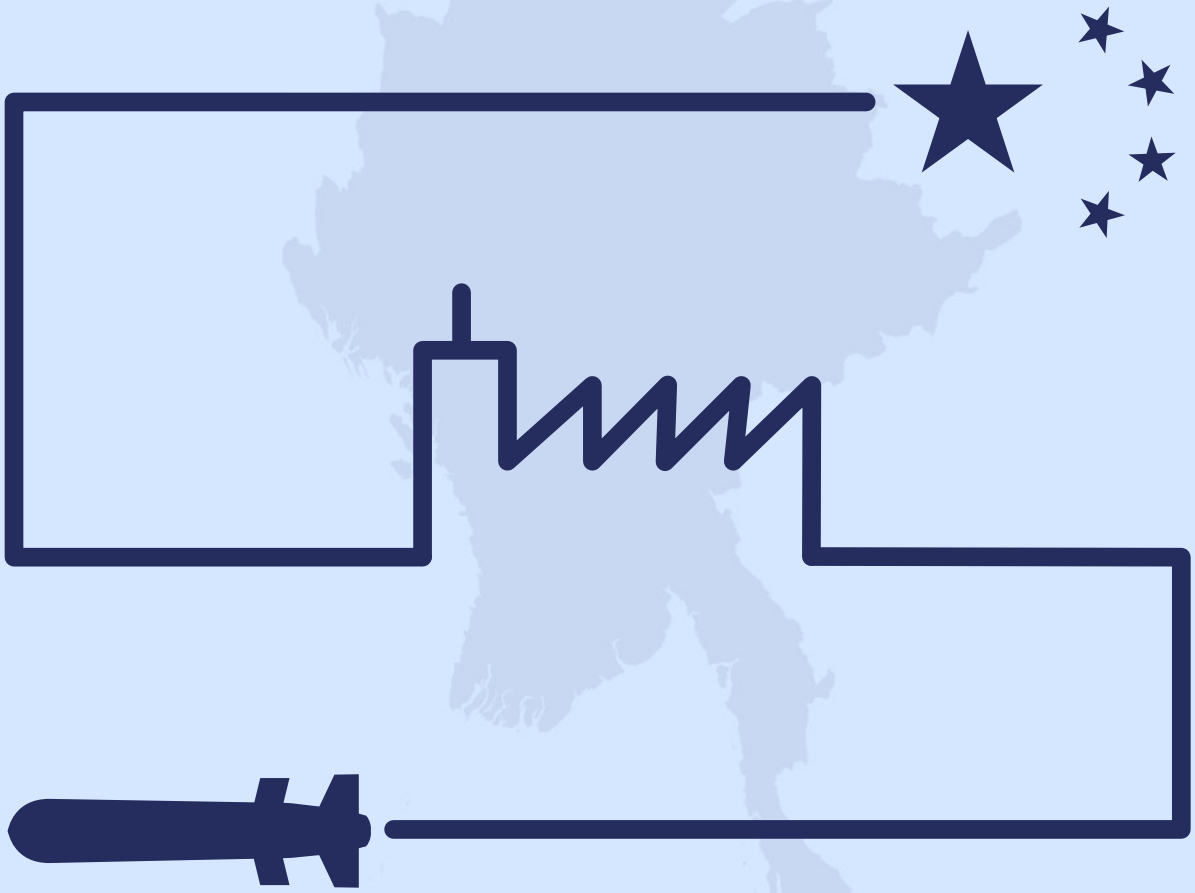
Factory of Death: China's Support for the Myanmar Military's Production of Aerial Bombs

A Case Study of Defence Industry 21

16 July 2025



Special Advisory Council for Myanmar

Contents

Acknowledgements

SAC-M expresses its deep gratitude to the principal researcher – who will remain unnamed – of this report and of its earlier report, *Fatal Business*.[1]

SAC-M is also grateful to the analytical team at Armament Research Services (ARES): N.R Jenzen-Jones, Charles Randall, Tony Salvo and Mick F.[2] ARES is an apolitical research organisation and contributed solely to the technical assessment of fuel air explosive aerial bombs underpinning this report.

SAC-M appreciates greatly the work of Justice for Myanmar, in particular in relation to the role of Chinese arms companies in Myanmar, which has been invaluable for this report.[3]

[1] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* January 2023 at https://specialadvisorycouncil.org/fatal-business/report/.

[2] https://armamentresearch.com/.

[3] https://www.justiceformyanmar.org/.

Senior General Min Aung Hlaing inspects DI 21-manufactured aerial bombs, including cluster munitions, alongside former Myanmar Air Force chief Maung Maung Kyaw (right) during an official Myanmar Air Force ceremony in 2018. (Official website of Senior General Min Aung Hlaing)

Key Messages

In January 2023 the Special Advisory Council for Myanmar (SAC-M) published its report *Fatal Business: Supplying the Myanmar Military's Weapon Production*, a study of the Myanmar military's domestic arms production.[4] Industrial-scale arms production in Myanmar is, in its entirety, a military-run affair, taking place at factories colloquially referred to as KaPaSa, after the Burmese name for the Office of the Chief of Defence Industries (OCDI), *Karkweye Pyitsee Setyone*, or Defence Industries (DI).[5] This report arises from the earlier, more comprehensive research. It looks at one factory, DI 21, as a case study of the Myanmar military's defence industry and its current and ongoing role in enabling the aerial bombardment – many of which may amount to serious international crimes – of the country's civilian population.

Based on leaked materials, information from human and open sources, and the technical assessment underpinning this report, SAC-M has come to a number of

[4] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* January 2023. Available at https://specialadvisorycouncil.org/fatal-business/report/.

[5] Aligning with the common use of the term 'DI' by individuals associated with the Myanmar military, this report uses the term 'DI' without taking this to mean that the factories produce weapons used by the junta for legitimate defence purposes.

conclusions relating to the role of DI 21 and its contribution to the Myanmar military's atrocity crimes against the people of Myanmar. It has also come to conclusions concerning foreign support, specifically from China, for the production of aerial bombs at DI 21.

SAC-M's conclusions include:

- Since its inception in 2004, DI 21 manufactures the main share of the OCDI's aerial bombs, including general purpose and special purpose aerial bombs, and also manufactures domestically designed cluster munitions.
- Aerial bombs made at DI 21 continue to be used in airstrikes that likely meet the threshold of serious international crimes.
- The particular focus of this report is air-delivered fuel air explosive (FAE) bombs manufactured at DI 21.[6] The manufacture of this type of wide-area effect bomb in Myanmar is unpacked in the present report to show how foreign assistance was needed, and utilised, by DI 21 to manufacture FAE bombs, and how the same foreign company worked with DI 21 to establish production of a wide range of aerial bombs. The Myanmar Air Force has used FAE bombs on at least three separate occasions, in 2015, 2017 and 2020. These bombs were Chinese CS/BBF1 250 kg FAE bombs that were either directly imported into Myanmar, or partially, predominantly or wholly made or assembled at DI 21.[7] The CS/BBF1 is manufactured by a Chinese wholly state-owned arms company, China South Industries Group Corporation (China South, CS).
- CS/BBF1 FAE aerial bombs were first showcased by China South at the 2012 Zhuhai Air Show and were transferred to Myanmar prior to 2015 when they were first used by the Myanmar Air Force. This transfer was likely coupled with a transfer of technology and technical assistance for the production of these bombs and additional aerial bombs in Myanmar. China South's president, Tang Denjie, met with the head of Myanmar's defence industry, Thein Htay, in September 2015, to discuss Myanmar's cooperation with the company and the introduction in Myanmar of advanced technology and equipment from China South.
- Foreign assistance, including schematics, training and other technical assistance, was utilised for the production of FAE bombs in Myanmar. The continued production of FAE bombs in Myanmar likely requires continuing foreign support.
- Beyond the FAE bomb, a large share of the aerial bombs currently being produced

[6] Fuel air explosive munitions are part of the broader family of thermobaric munitions, which are sometimes also referred to as 'volumetric' or 'enhanced blast' munitions. See Appendix A.

[7] Armament Research Services (ARES) *ARES assessment: purported fuel air-explosive munitions in Burma 26* January 2024.

at DI 21 show striking similarities with aerial bombs that are designed, manufactured and marketed by China South. Production of these bombs in Myanmar has relied on both technical and material assistance from China South. SAC-M considers it highly likely that OCDI and China South collaboration – principally implemented by China South's fully owned subsidiary Hunan Vanguard – has entailed a transfer of technology and associated assistance for DI 21 to set up production of a wide range of aerial bombs.

- China South, through Hunan Vanguard, has played a key role in the production process at DI 21 and has been essential to establishing the majority of the factory's current production lines. This assistance has entailed:
    - The presence of engineers from China South and its subsidiaries at DI 21 between 2014 and 2019
    - Munitions production training for DI 21 staff in China in 2015 and 2019
    - Since 2019, the continued supply of key components and
    - Since 2019, the continuation of remotely provided technical assistance.
- SAC-M has also received credible information that DI 21 staff are currently undertaking advanced studies at Chinese universities (carrying out high levels of defence research) in areas of direct applicability to aerial bomb production.
- China South is directly and wholly owned by the State Council of China, that is, the central government of China. China South's involvement in the transfer of aerial bombs and associated technical production assistance to Myanmar would have required export control permits from state authorities and should be understood as authorised by the State Council of China.[8]

In attempting to put down widespread resistance to the attempted coup launched by the Myanmar military in February 2021, the Myanmar Air Force has been increasingly deployed for airstrikes on populated areas. Countrywide data confirms the use of fighter jets, helicopters and UAVs to bomb locations across Myanmar at unprecedented rates. Local researchers estimate that, in the final four months of 2023 alone, the military carried out 750 airstrikes across 11 regions in Myanmar, with an average of six airstrikes nationwide every day.[9] That rate continued to increase in 2024. Aerial attacks

[8] China's formal export control mechanisms for conventional arms began with the establishment of the Regulations of the People's Republic of China on the Administration of Arms Exports, which was promulgated by the State Council and the Central Military Commission (CMC) in October 2017. This regulation was subsequently amended in 2002 with the promulgation of the Administrative List of Export of Military Products. The list outlined, for the first time, the specific military goods that would fall within the scope of controls and would require permits for export. Comprising 14 distinct categories of military items, the list covered both munitions (including aerial bombs) and transfers of military engineering equipment and facilities for the production of convention arms. Put differently, the CS/BBF1 and other aerial bombs, and assistance for their production in Myanmar, would have been covered.

[9] Nyan Lynn Thit Analytica *Aerial Attacks Carried Out by the Military Council* 9 February 2023, available at

continue even now, in the wake of the catastrophic March 2025 earthquakes. The military has used airstrikes to target homes, schools,[10] hospitals,[11] religious structures, and crowded markets[12] resulting in civilian fatalities and mass displacement. Many of the military's airstrikes are widely considered to be in breach of international humanitarian law and to constitute war crimes and crimes against humanity.[13]

Companies and corporate executives that provide military support to the Myanmar junta, enable the production of aerial bombs or otherwise facilitate the airstrikes may expose themselves to the risk of criminal and civil liability.[14] In October 2024, the UN Independent Investigative Mechanism for Myanmar (IIMM) noted that its investigations into the most serious international crimes committed in Myanmar also include a detailed analysis of the types and models of weapons used, how they were used and where they came from. The IIMM noted that individuals who supply weapons, knowing they could be used to commit international crimes, could be held responsible for enabling those crimes and that, by examining weapons and their origins, the Mechanism is building comprehensive cases against individuals responsible for atrocities in Myanmar.[15]

SAC-M encourages use of the findings in this report for justice and accountability processes targeting the identified corporate actors and their executives for their roles in enabling the junta's production of aerial bombs. It also encourages additional research on individual DI factories and their supply chains that enable the sustained production of weapons by the military junta in Myanmar.

https://progressivevoicemyanmar.org/wp-content/uploads/2024/02/Aerial-Attacks-Carried-out-by-the-Military-Council-3.pdf. Accessed 20 September 2024.

[10] UNICEF Statement: *At least 11 schoolchildren killed in Myanmar attack* 19 September 2022, available at https://www.unicef.org/eap/press-releases/least-11-schoolchildren-killed-myanmar-attack, Last accessed 20 August 2023. Independent Investigative Mechanism for Myanmar *The Myanmar Mechanism calls for information about aerial attack on school* 14 May 2025, available at https://iimm.un.org/en/myanmar-mechanism-calls-information-about-aerial-attack-school. Last accessed 5 June 2025.

[11] Myanmar Witness *Pekon Hospital School Bombing* 2 May 2023, available at https://www.myanmarwitness.org/reports/pekon-hospital-bombing. Accessed 16 July 2024. Centre for Information Resilience and Myanmar Witness *Healthcare denied: Medical facilities under attack* 3 January 2024, available at https://www.info-res.org/myanmar-witness/reports/healthcare-denied-medical-facilities-under-attack/. Last accessed 5 June 2025.

[12] Moe Oo *At least nine killed in junta airstrike on busy market in Myanmar's Mandalay Region* Myanmar Now, 14 March 2025, available at https://myanmar-now.org/en/news/at-least-nine-killed-in-junta-airstrike-on-busy-market-in-myanmars-mandalay-region/. Accessed 9 April 2025.

[13] See for example United Nations Regional information Centre for Western Europe Myanmar: *"Many reports of brutal war crimes and crimes against humanity"* 18 February 2025, available at https://unric.org/en/myanmar-many-reports-of-brutal-war-crimes-and-crimes-against-humanity/. Last accessed 5 June 2025.

[14] Tomas Hamilton *The Arms Trade and International Criminal Law: Reframing Accountability for Complicit Weapon Suppliers* Oxford University Press 2025, available through https://doi.org/10.1093/oso/9780192868671.001.0001. Last accessed 5 June 2025.

[15] IIMM *Bulletin* Issue 12, October 2024, p 6, available at https://iimm.un.org/sites/default/files/2024/10/2024_October-Bulletin-EN.pdf. Last accessed 5 June 2025.

Glossary and Abbreviations

aerial bombs	bombs dropped from an aerial vehicle and designed to achieve a state of free fall as they reach the intended target or target area, also commonly referred to as air-delivered bombs[16]
China South	China South Industries Group Corporation, a fully state-owned Chinese company involved, among other things, in arms production
Chongqing Changan	Chongqing Changan Industry Group Company Limited, a subsidiary of China South and a known producer of aerial bombs
cluster munition	munitions designed to disperse explosive submunitions, also called 'carrier munitions' or 'cargo munitions'[17]
DDI	Directorate of Defence Industries in Myanmar, currently known as the Office of the Chief of Defence Industries
DI	Defence Industry, or KaPaSa (after the Burmese name for the Directorate of Defence Industries, *Karkweye Pyitsee Setyone*), where the Myanmar military's in-country weapon production takes place
FAE	fuel air explosive munitions, part of the broader family of thermobaric munitions (sometimes also referred to as 'volumetric' or 'enhanced blast' munitions)
Hunan Vanguard	Hunan Vanguard Group Co. Ltd., a subsidiary company of China South and China South's aviation munitions research institute
munition	an expendable item designed to achieve operational effects by means of an effect mechanism, which travels from a source (for example, a weapon or vehicle) by a method of delivery (for example, fired or dropped) to a target or target area[18]
OCDI	Office of the Chief of Defence Industries, formerly known as the Directorate of Defence Industries (DDI), a fully state-owned and military-controlled enterprise in Myanmar, the principal organisation overseeing the domestic

[16] Open Source Munitions Portal *Resources: Air-delivered bombs*. See https://osmp.ngo/resources/air-delivered-bombs/. Last accessed 5 June 2025.

[17] Jenzen-Jones, N.R. *Munitions Employing Sensor-fused Submunitions: Do they Comply with the Convention on Cluster Munitions?* 2021 Armament Research Services (ARES) Special Report № 4. Perth

[18] Armament Research Services (ARES) *ARCS: the ARES arms & munitions classification system*, available at https://armamentresearch.com/wp-content/uploads/2022/08/The-ARES-Arms-Munitions-Classification-System-ARCS-ver1.3-public-release.pdf. Last accessed 5 June 2025.

	manufacture and assembly of weapons in Myanmar
PDF	People's Defence Force, an umbrella term for armed resistance groups that have emerged since the military's attempted coup in 2021, generally larger armed units formed or recognised by the Myanmar National Unity Government, mainly operating under joint command systems established by the National Unity Government and several ethnic armed organisations, many of which have been in active conflict with the military for decades
PLA	People's Liberation Army, the armed forces of the People's Republic of China
PLAAF	People's Liberation Army Air Force, also referred to as the Chinese Air Force or the People's Air Force, the military aerial service branch of the People's Liberation Army
SAC-M	Special Advisory Council for Myanmar[19]
thermobaric munitions	munitions containing explosive payloads designed to detonate in a way that optimises both heat and blast effects on targets by utilising ambient oxygen from the surrounding air, sometimes considered to be part of the broader group of 'volumetric' or 'enhanced blast' munitions or 'vacuum bombs'
UAV	unmanned aerial vehicle, colloquially called a drone
USCC	Unified Social Credit Identifier, issued by the Chinese Government to registered companies and other types of organisations, used both as the business registration number with the State Administration for Market Regulation and as the taxpayer identifier with the State Taxation Administration, necessary for operating a business in China
volumetric weapon	another term sometimes applied to so-called 'enhanced blast explosive' weapons, including both thermobaric and FAE munitions

[19] https://specialadvisorycouncil.org/.

Methodology

This report relies on a broad range of sources, including

- **Open-source evidence** SAC-M has analysed dozens of items of digital content depicting airstrikes and their aftermath in various locations across Myanmar. Media coverage, frontline reports and reports of local and international human rights organisations, UN- mandated investigative mechanisms and Special Rapporteurs have also been analysed. SAC-M has also had access to corporate documents from China and Myanmar and has analysed open-source information in Chinese, English and Burmese on official company and government websites, including archived versions of these websites.
- **Testimonial evidence** SAC-M has engaged directly with more than 40 individuals with first-hand experience of relevant branches of the Myanmar military. SAC-M has also communicated with individuals formerly associated with the Chinese state-owned companies identified in this report. SAC-M informed all sources about the nature and purpose of the research and about how the information they provided would be used. Oral consent was obtained from each source as a first step in engagement.
- **Documentary evidence** SAC-M has had access to a large quantity of official detailed technical documents from within the Myanmar military about its arms manufacturing.
- **Remote sensing** The research has relied on data gathered from remote sensing on several locations of relevance for the military's production, storage and use of aerial bombs.
- **Interviews** SAC-M interviewed experts on the Chinese defence sector and the modalities for arms transfers and associated export controls from China. SAC-M also sought input from experts on Myanmar-China relations and consulted investigators and experts in international human rights and international humanitarian law.
- **Technical expert assessment** SAC-M commissioned expert assessment of technical data for Myanmar-made 250 kg FAE aerial bombs, as well as photos of undetonated FAE submunitions and fragments and remnants of detonated FAE aerial bombs in Myanmar.[20] The expert assessment sought to determine the specific make and manufacturer of the air-delivered FAE bombs used by the Myanmar Air Force and to assess the OCDI's capability to successfully manufacture 250 kg FAE aerial bombs alone or with the support of external parties. The assessment considered:
    - the extent to which the Myanmar-made FAE aerial bomb was likely a design developed within Myanmar or based on an existing FAE bomb design from elsewhere

[20] Armament Research Services technical expert analysis commissioned by SAC-M: *ARES assessment: purported fuel air-explosive munitions in Burma* 26 January 2024.

- if the FAE aerial bomb produced at DI 21 could have been reverse engineered, that is, designed, developed and manufactured without any external support, through copying existing designs
- if production through reverse engineering of the munition was unlikely, whether technical assistance for setting up production at DI 21 could have been supplied by external sources
- in the event assistance for production was supplied by external sources, which sources and what type of assistance were likely.

The report explores the key role of a Chinese, fully state-owned arms company, China South Industries Group Corporation, and its subsidiaries that have enabled the Myanmar military's manufacture of FAE and other aerial bombs at DI 21. SAC-M's research also identified additional companies and associated state authorities in China that may have played a role in enabling the military's production of FAE and other aerial bombs in Myanmar. SAC-M wrote to these companies and to the relevant State authorities in May 2024 and in July 2025 to provide an opportunity to respond to the findings. Full copies of SAC-M's letters have been posted on SAC-M's website.[21] When this report went to print, none of the companies or relevant government authorities contacted had responded to SAC-M's request for information.

Standard of proof

SAC-M has reached its conclusions based on the standard of proof known as 'reasonable grounds' adopted by UN independent international commissions of inquiry and fact-finding bodies.[22]

[21] https://specialadvisorycouncil.org/fatal-business/company-response/.

[22] Office of the High Commissioner for Human Rights *Commissions of inquiry and fact-finding missions on international human rights and humanitarian law: guidance and practice* 2015 p 62-3, accessible through https://www.ohchr.org/en/hr-bodies/hrc/co-is. Last accessed 5 June 2025.

The aftermath of military junta airstrikes on a community gathering that killed at least 155 people in Pazigyi village, Kantbalu township, Sagaing region on 11 April 2023. (Myanmar Now)

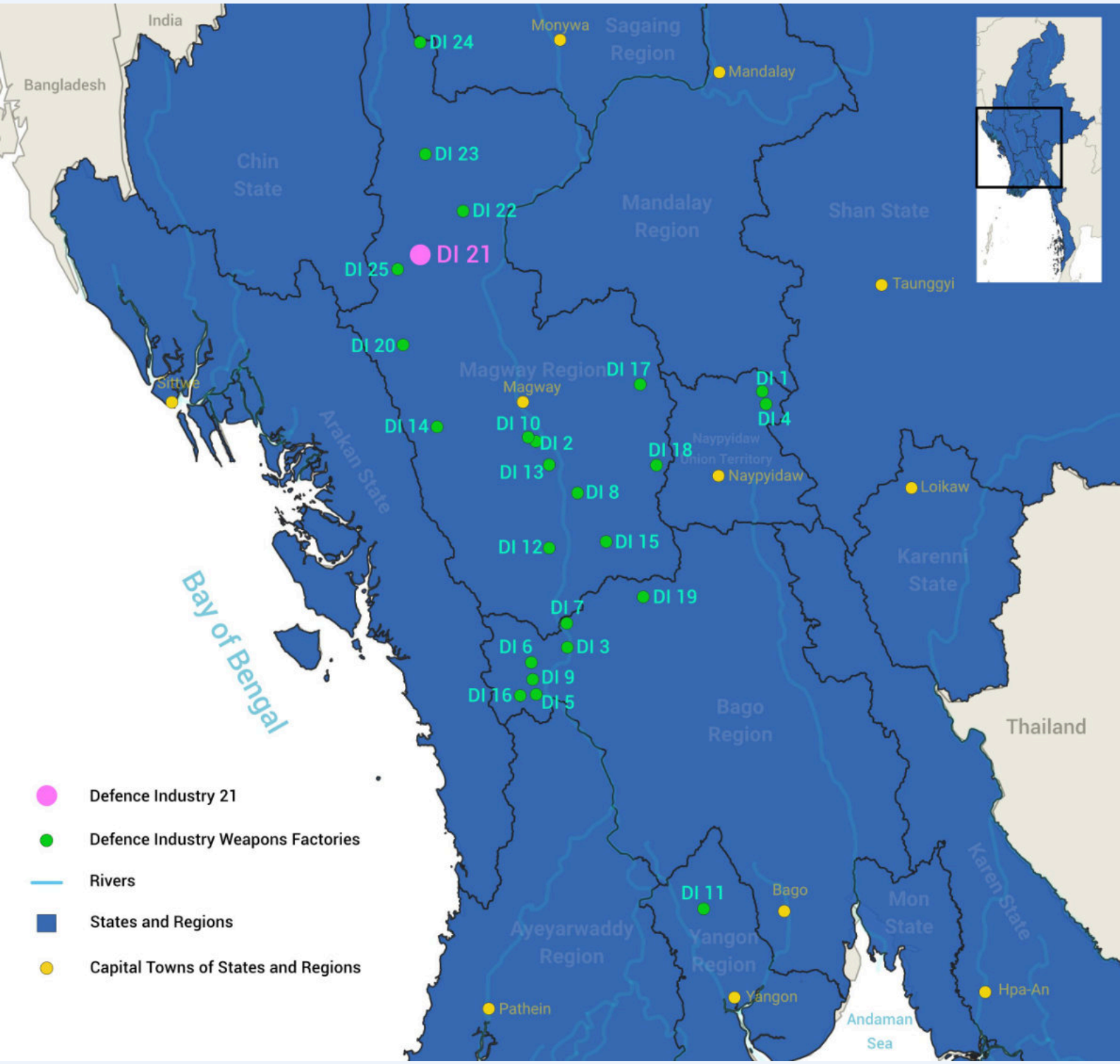
1. Introduction

In January 2023 the Special Advisory Council for Myanmar (SAC-M) published its report *Fatal Business: Supplying the Myanmar Military's Weapon Production*, a study of the Myanmar military's production of arms.[23] The report found that the Myanmar military's arms manufacturing industry is, in its entirety, a military-run affair. As a fully state-owned and military-run enterprise, the Office of the Chief of Defence Industries (OCDI), formerly known as the Directorate of Defence Industries (DDI), is the principal organisation overseeing the domestic design, manufacture and assembly of arms in Myanmar. As a part of the military's structure, the OCDI operates under the Myanmar Ministry of Defence and reports to the Office of the Commander in Chief.

The military's arms production takes place at factories colloquially referred to as KaPaSa (after the Burmese name for the OCDI, *Karkweye Pyitsee Setyone*) or Defence Industries (DI).[24] The first DI factories were established in the 1950s in, or close to, the then capital Yangon. Since then, their numbers have increased and their production lines have diversified.

[23] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* 2023 at https://specialadvisorycouncil.org/fatal-business/report/.

[24] Aligning with the common use of the term 'DI' by individuals associated with the Myanmar military, this report uses the term 'DI' without taking this to mean that the factories produce weapons used by the junta for legitimate defence purposes.



Locations of Myanmar military Defence Industry weapons factories.

The OCDI does not disclose the precise number of DI factories nor their precise locations.[25] However, as SAC-M showed in *Fatal Business*, the military operates 25 of these factories, most of them located in the sparsely populated and lightly wooded areas of Myanmar's central lowlands, notably in the Magway and Bago regions.[26] Many of these factories benefit from the natural protection offered by bodies of water or mountainous features, which increase their isolation, making them more difficult to access.

The DI factories perform a wide variety of functions, including processing raw materials, manufacturing components, assembling weapons, re-assembling components shipped into Myanmar from abroad, adapting dual-use technologies and performing repair and maintenance functions. The result is a large, sprawling multi-layered and multi-faceted arms industrial complex that has evolved over the years and that is still evolving. The DI factories operate as an inter-connected network in which each factory plays its dedicated part in processing materials and manufacturing components for use in the production and assembly of weapons at other factories.

The military has continued to invest significantly in strengthening and modernising its domestic weapons production, principally as a response to international arms sanctions that have made it increasingly difficult for the junta to import complete weapon systems and arms. Since the junta launched its coup attempt on 1 February 2021, the Myanmar military and the OCDI have been subjected to additional sanctions and restrictive measures by individual states, most notably the United States, the United Kingdom, Canada, Australia and New Zealand, and groups of States, especially the European Union. Among ASEAN states, Singapore has also imposed an arms embargo on the Myanmar military.[27] While the DI factories significantly lessen the military's reliance on imports of arms, the OCDI remains reliant on international supplies, including raw materials, parts and components, technology and machinery, for the sustained production of weapons in Myanmar.[28]

As has previously been noted by SAC-M, the OCDI is known to produce weapons both under licence and without licence from the owner of the technology.[29] Unlicensed production is usually effected through a process of reverse engineering, which involves deconstructing a specific weapon or munition to extract design information and seeking to reproduce the design in actual or improved

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[25] While the military has not publicly disclosed the locations, the Ministry of Electricity and Energy (MOEE) listed, seemingly mistakenly, some of the factory locations in the context of its public disclosure of electricity stations in the Magway and Bago regions. The listed locations of arms manufacturing factories in Magway were later removed, in November 2021, from the military-run MOEE website.

[26] In addition to the 25 unique DI factories, the OCDI also oversees a defence equipment logistics and support unit located in Thilawa (Yangon) and two large equipment factories, Myanmar Heavy Industries (MHI) 1 and 10 in Meiktila and MHI 2 in Yinmabin. OCDI also runs a defence equipment production training school near Kwin Hla village in Oke Shit Pin, Bago region, and several more recently established equipment production units in Magway, Malun and Htone Bo.

[27] Singapore Minister for Foreign Affairs, oral reply to Parliamentary question, 14 February 2023, available at https://www.mfa.gov.sg/Newsroom/Press-Statements-Transcripts-and-Photos/2023/02/20230214-PQ. Last accessed 5 June 2025.

[28] See Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* 2023 at https://specialadvisorycouncil.org/fatal-business/report/.

[29] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* 2023 at https://specialadvisorycouncil.org/fatal-business/report/.

form.[30] While DI factories have reverse engineered a variety of weapons, a technical expert assessment commissioned by SAC-M confirmed that the OCDI is unlikely to have been able to reverse engineer sophisticated weapons such as the CS/BBF1 FAE bomb.

The OCDI is also known to have produced specific weapons and munitions under licence from the owner of the technology. Licensed production entails the owner of the technology assisting the OCDI in various ways to establish local production in Myanmar, including in the form of

- contracts under which the owner of the technology transfers the know-how to the OCDI, either in tangible form (for example, by sharing documents, blueprints of machines or products, technical datasheets and/or manuals) or in intangible form (for example, by offering training to personnel or inviting personnel to observe the production of a specific weapon in the country where the owner has production sites, or by facilitating conversations between engineers associated with the owner and DI engineers);
- the acquisition of equipment whereby the technology owner transfers tools, equipment and machinery, entire production lines or components of parts for assembly through a sale or as a donation, the latter often taking place as a means for the country of domicile of the technology owner to gain some political or economic *quid pro quo*, such as voting in a certain manner at the United Nations or promises of lucrative business opportunities in Myanmar;
- turn-key projects where the owner of the technology hands over an entire industrial plant or production line that then operates according to agreed standards; and/or
- joint venture arrangements under which the technology owner enters a commercial partnership with the client or other businesses to enable specific production lines at defence industry facilities.

This report looks at one DI factory, DI 21, as a case study of the Myanmar military's weapons production. DI 21 produces the main share of the Myanmar military's aerial bombs.[31]

SAC-M's focus on DI 21 is in response to the significant role of the Myanmar Air Force in the international crimes committed by the military junta through the use of aerial bombings. In the current context in Myanmar, the Air Force has been increasingly deployed for airstrikes on populated areas. The focus on the FAE aerial bomb specifically was prompted by allegations that the Myanmar military has committed war crimes by using air-delivered 'thermobaric weapons', including FAE bombs, in populated areas. For a non-exhaustive list of occasions on which FAE bombs have been used by the Myanmar military—both alleged and confirmed by experts commissioned by SAC-M—since March 2015, see Appendix B. FAE aerial bombs are highly destructive due to their wide area impacts, and their use increases both the quantity and severity of injuries to which victims would normally be exposed with conventional explosive weapons.[32]

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[30] See Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* 2023 p 43 at https://specialadvisorycouncil.org/fatal-business/report/.

[31] A limited number of smaller-size aerial bombs are also manufactured at DI 3.

[32] Van Coller, A. 'Detonating the air: The legality of the use of thermobaric weapons under international humanitarian law'.

Analysis of a wide variety of evidentiary materials, including human testimony from Chinese and Myanmar sources, leaked munitions production data and visual evidence, confirms that assistance by China South, a Chinese, fully state-owned company, has been essential to establishing the full range of production at DI 21. This report presents evidence that this assistance has entailed

- the provision of technical design and other intellectual property for the production of aerial bombs at DI 21
- the on-site presence at DI 21 of technicians and support staff from Hunan Vanguard, a China South subsidiary, for the provision of technical assistance, supervision and quality control of production of DI 21-manufactured aerial bombs
- munition production training for DI 21 staff in China at two China South subsidiaries, Chongqing Changan in 2012 and Hunan Vanguard in 2015 and 2019[33]
- the supply of key components for the production of aerial bombs, including micro-electronics
- continuing, remotely provided technical support from China South technicians to DI 21 staff for bomb production.

This report focuses solely on DI 21 for its role in the production of aerial bombs in Myanmar. SAC-M encourages additional research on individual DI factories and their supply chains that enable the sustained production of weapons by the military junta in Myanmar and, more broadly, on OCDI's contribution to the Myanmar military's atrocities since the attempted coup of 2021. Further investigation is also necessary to determine whether any foreign states, corporations or individuals may be responsible for aiding and abetting the commission of war crimes in Myanmar as a result of their support for the Myanmar military's arms industry.

SAC-M calls on all governments to take action against the companies identified in this report as enabling the military's production of aerial bombs: China South, Chongqing Changan and Hunan Vanguard. Urgent action is also needed to ensure that the OCDI can no longer access technical assistance and foreign supplies, in particular micro-electronics, for the continued production of aerial bombs.

Building a just and peaceful future for all of Myanmar's peoples requires acting now to end the military's grave violations and abuses of international human rights and humanitarian law, and to ensure that all those responsible for such violations and abuses can be tried and held accountable through criminal trials in international and national courts and tribunals established and operating in accordance with international standards of justice.

International Review of the Red Cross (2023) 105 (923), 1125-1151, available at https://international-review.icrc.org/sites/default/files/reviews-pdf/2023-06/detonating-the-air-the-legality-of-thermobaric-weapons-under-ihl-923.pdf. Last accessed 5 June 2025.

[33] Representatives of Chongqing Changan also met with engineers from DI 4 in Chongqing in 2013. DI 4 is the central hub for arms production in Myanmar in charge of developing new weapon designs for the remaining DI factories in Myanmar.

DI 21 is located in Seikphyu township, Magway region, Myanmar. (Via Google Earth/Screenshot)

2. Introducing DI 21

2.1 DI 21's Establishment

DI 21 is located in the vicinity of Kyatpè, Seikphyu township, in the Magway region of Myanmar.[34] Remote sensing confirms that the factory was established between 2004 and 2006. Human sources have confirmed to SAC-M that at the end of 2004 the factory was partially operational.

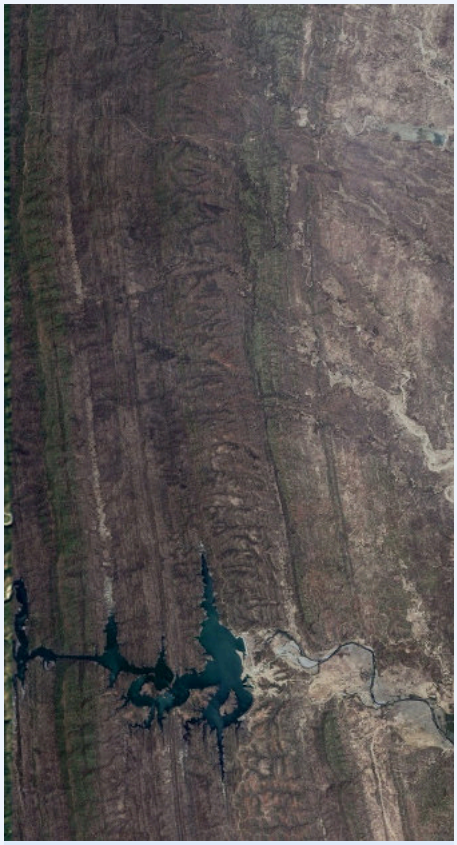
By December 2007 the principal production facilities at DI 21 appear almost complete on satellite imagery. Progressively since then, additional infrastructure, including helipads, paved roads, guesthouses and buildings for workers, have been erected. Unfinished buildings appear on satellite imagery as recently as March 2024, suggesting that the factory and associated worker residence facilities are still being expanded.

According to credible sources, approximately 1200 people are employed at DI 21, including 150 officers overseeing the daily activities of the factory complex and its production. Factory engineers

[34] The location of the factory and its various production units, administrative buildings, accommodation for workers and an on-site guesthouse have been verified through multiple independent sources, including Myanmar military documents and open-source information by independent Myanmar media outlets and resistance forces in Myanmar. The exact location of DI 21 has also been marked in Google Earth by unknown users as 'Ka Pa Sa 21'.

and administrative staff live on site, or with their families in three villages (Ngabyagyi, Thayetkhon and Shaukpin Inn) located in the immediate vicinity of the aerial bomb production facilities. With its school, shop, pagoda and sports fields, the sprawling DI 21 complex is more than a factory. It is a tight-knit community with aerial bomb-production at the centre of economic and social life. DI 21 workers and their families participate in religious ceremonies, organise night markets and play football matches and rounds of golf, all within the confines of the DI 21 community. Residents collect and distribute food donations for the needy and even organise tree-planting drives to combat climate change. In many ways, life inside DI 21 closely resembles life in any rural Myanmar village.

Access to the factory buildings, including administrative buildings, explosive workshops and buildings for assembly of the bombs, passes through the villages for DI 21 workers and their families and a guarded checkpoint.



DI 21- December 2004

DI 21- December 2007

DI 21- December 2009

Satellite photos showing the gradual expansion of DI 21.
(Landsat 7 imagery U.S. Geological Survey/NASA. Accessed via Google Earth Pro)

A recent satellite image of the DI 21 school, including the school football field, and an adjacent village for workers and families. (Airbus accessed via Google Earth Pro)

A satellite photo of DI 21 helipads in March 2023. (Airbus accessed via Google Earth Pro)

A satellite photo of DI 21's main checkpoint in September 2024.
(Airbus accessed via Google Earth Pro)

> DI 21 is a tight-knit community with aerial bomb-production at the centre of economic and social life.

2.2 DI 21's Location and Vulnerability

Similar to other DI factories, DI 21 is situated in an isolated and sparsely populated area in Myanmar's central lowlands. Long considered the military's traditional stronghold, the lowlands have not yet experienced the sophisticated, coordinated resistance attacks that have been highly effective against military positions in northern Shan, Karen, Karenni, Kachin and Rakhine states. Local resistance forces have lacked the long-range artillery, armoured vehicles or military aircraft needed to effectively target the isolated DI factories. The factory complexes are spread across vast areas of land, further reducing the chances of successful strikes on critical infrastructure within them.[35] DI 21 enjoys protection from Mount Victoria to the west and the Salyin dam reservoir to the south. Access to the complex and its facilities, including administrative buildings, explosive workshops and buildings for assembly of the bombs, passes through villages for DI 21 workers and their families and a guarded checkpoint.

While the OCDI was undertaking its most recent expansion of DI 21, allied resistance forces were inflicting major losses on the military in other parts of the country. This included the capture of hundreds of military outposts, towns, cities and two of the military's 14 regional commands. Despite the critical importance of domestic arms production to the military's survival, resistance forces have struggled to successfully attack, let alone seize, DI factories. That, however, may soon change.

In December 2024 the Arakan Army captured the military's western regional command in Ann township, Rakhine state. This historic victory at Ann led to the near total collapse of the military's western flank. Now armed with long-range artillery, rocket launchers and tanks captured from the military, the Arakan Army has since fought its way east through the Rakhine-Yoma mountains towards the lowlands of Magway and Bago. The majority of the military's 25 DI factories, including DI 21, are located in this area, between the mountains to the west and the Irrawaddy River to the east. For the first time since they were built, the military's DI factories now face a serious threat of attack from a well-armed, well-organised and battle-experienced adversary.[36] On 31 March 2025, a number of armed resistance forces, under the command of the Bamar Army 3rd Battalion, reportedly "carried out a major attack on the Tanyaung Power Plant in Salin township, Magway region, which supplies electricity to the junta's Defence Product Industries including Military Weapons Factories No. 20, 21, 25, as well as Air Defence Command Centre No. 9. The attack caused an estimated 80% destruction to the facility, according to sources from the resistance."[37]

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[35] On 16 April 2024 a coordinated attack on DI 21 was carried out by PDFs in Magway, reportedly without any material damage to any of the production facilities. The Black Hawk Seikphyu Revolution Front PDF claimed that it had damaged buildings and injured personnel. On 18 January 2025, the Brave Warriors for Myanmar PDF unit reported that it had attacked DI 21 using 107mm rockets, and that seven of the rockets successfully hit intended targets. See https://www.nmg-news.net/2025/01/20/30930. Last accessed 5 June 2025.

[36] Ko Cho *Myanmar's resistance closes in on junta's factories of death* Myanmar Now, 11 March 2025, available at https://myanmar-now.org/en/news/myanmars-resistance-closes-in-on-juntas-factories-of-death/. Accessed 9 April 2025. Last accessed 5 June 2025.

[37] Mizzima *Power plant supplying Myanmar junta's military factories hit by PDF attack* 10 April 2025, available at https://eng.mizzima.com/2025/04/10/21208?fbclid=IwY2xjawJla0hleHRuA2FlbQIxMAABHlzyCnG2KgR96-NFV_

A satellite photo of the production complex at DI 21 in its entirety in May 2024.

(Airbus accessed via Google Earth Pro)

2.3 DI 21's Production

Internal OCDI documents provided to SAC-M confirm that DI 21 produces a variety of 250 and 500 kg unguided aerial bombs,[38] including:

- 250 kg FAE bombs
- 250 kg low drag, high altitude high explosive (HE) bombs
- 500 kg low drag, high altitude HE bombs
- 250 kg low drag, low altitude HE bombs
- 500 kg low drag, low altitude HE bombs
- 250 kg anti-tank bombs
- 250 kg carbon fibre bombs
- 250 kg combined effect bombs
- 250 kg area blockage bombs.

The DI 21 designed cluster bombs contain 81 mm or 120 mm mortar projectiles as submunitions, respectively. Reportedly, the submunitions are manufactured at DI 3 and then transported to DI 21 for assembly into cluster munitions. These types of cluster munitions were used by the Myanmar Air Force as early as 2012-13[39] and have been used increasingly since February 2021.[40] Technical analysis also confirms that DI 21 has sought to manufacture munitions for UAVs. The current status of this production is unknown.

DI 21-manufactured aerial bombs, in particular domestically produced 250 kg aerial bombs, continue to be widely used by the Myanmar Air Force in indiscriminate attacks on civilians.[41]

nrJeXTF9FwHW0Ide4lSSGhEakj9dgrQeQfV9ai5pWa_aem_vTf0wLn8H-2zpIYONWxluA. Accessed 11 April 2025. Last accessed 5 June 2025.

[38] An unguided aerial (or air-delivered) bomb is a bomb that cannot alter its course during free-fall, instead following a ballistic trajectory after being dropped by an aircraft. See Open Source Munitions Portal Resource Page, available at https://osmp.ngo/resources/air-delivered-bombs/. Last accessed 5 June 2025. According to human sources, the OCDI aspires to manufacture guided aerial bombs but lacks the technical capacity to do so for the time being.

[39] It is not known when the Myanmar military began assembling this weapon but it used a prototype adapter of more rudimentary design, including repurposed munitions, against an ethnic armed group in Kachin state in late 2012 or early 2013. See Cluster Munition Monitor 2013 http://archives.the-monitor.org/index.php/cp/display/region_profiles/theme/2871. Last accessed 5 June 2025. See Appendix A for discussion of thermobaric and FAE bombs.

[40] See, for example, Cluster Munition Coalition *Briefing Paper Cluster Munition Production and Use in Myanmar/Burma* August 2023 at https://reliefweb.int/report/myanmar/briefing-paper-cluster-munition-production-and-use-myanmarburma-august-2023-tracking-progress-toward-world-free-landmines-and-cluster-munitions-enmy. Last accessed 5 June 2025.

[41] Bellingcat *Burning Villages: Violence Escalates as Myanmar Military Reacts to Territorial Losses* 2024, available at https://www.bellingcat.com/news/rest-of-world/2024/06/05/myanmar-military-territorial-losses-war-conflict-human-rights-burma/. Last accessed 5 June 2025. According to technical analysis by the Cluster Munition Coalition, the Myanmar Air Force has regularly carried out airstrikes with Myanmar-made cluster munitions, in particular since 2021. See Cluster Munition and Landmine Monitor *Briefing Paper on cluster munition production and use in Myanmar* 2023, available at https://reliefweb.int/report/myanmar/briefing-paper-cluster-munition-production-and-use-myanmarburma-august-2023-tracking-progress-toward-world-free-landmines-and-cluster-munitions-enmy. Last accessed 5 June 2025.

An undetonated 250 kg HE bomb, produced at DI 21, and used by the Myanmar Air Force on 23 February 2023 in Thantlang, Chin State where it was dropped on a school. (Free Bruma Rangers)

250 kg aerial bombs racked together being transported in an aircraft by the Myanmar military for future use in bombardments. (Myanmar Defence and Security Institute)

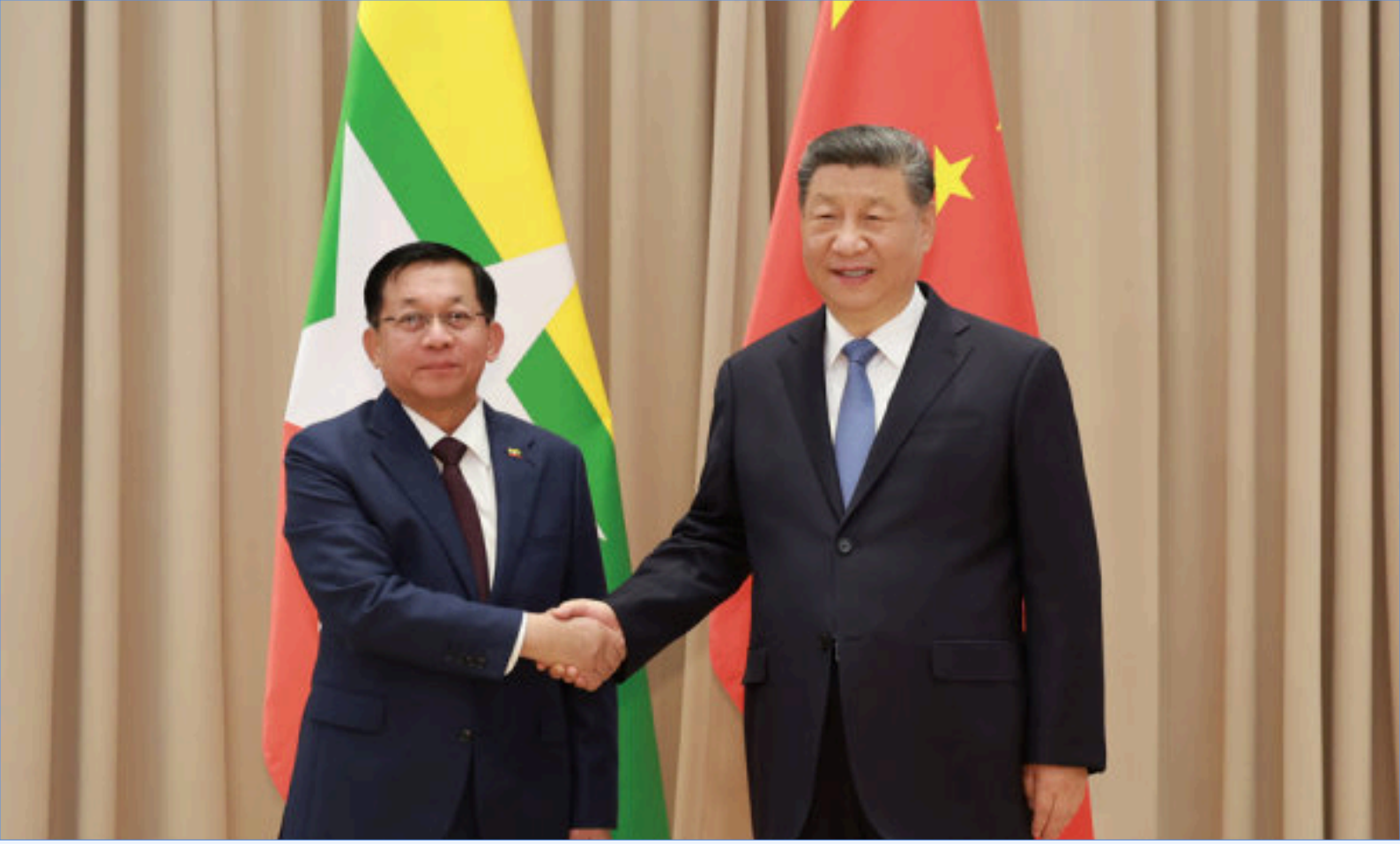
2.4 The 250 kg FAE Aerial Bomb Made at DI 21

The Myanmar made 250 kg FAE bomb contains two FAE submunitions (also known colloquially as 'bomblets') which make up its payload. The exact composition of the submunition payload in the Myanmar-made bomb is unknown but it is presumed to be a flammable, caustic fuel in either slurry/gel or liquid form.

The bomb comes with all fuzes and submunitions installed prior to deployment. The bomb's AH-20 (or AH-20A) nose fuze receives both power and time-delay instructions from the aircraft prior to and during release. The time delay is based on the speed, altitude and weather conditions. Once the time delay has passed, the nose fuze initiates the detonation cord which cuts the tailfin assembly free from the bomb's body. The tailfin assembly's spring-loaded parachute facilitates separation. Parachutes on each submunition in turn pull it loose from the bomb body and the submunition begins its descent, its rate of fall retarded by the parachutes. Each submunition's two-stage AH-21 fuze assembly is armed during this process. Upon impact with the ground, the contact or impact portion of the fuze ruptures the submunition's casing and disperses the fuel payload into a cloud. Shortly after, the second stage of the AH-21 detonates the cloud, producing a devastating blast wave that causes the highest levels of casualties and damage. Thermal effects will also be substantial but not as great as the effects of the pressure wave.

Based on the bomb's design and function, the Myanmar military's FAE bomb can be used in attacks on a wide variety of targets, such as trenches and bunkers, buildings, radar stations, missile launch sites, supply bases and airfields. Personnel in open terrain or even dense jungle will be vulnerable within the blast radius. As it contains a fuel air explosive payload, the bomb would be effective against the open entrances to underground facilities. Its stated area of effectiveness is 4,000 m2 per submunition but this is highly dependent on optimal deployment, atmospheric conditions, terrain and other factors and should be treated as a nominal value only. Under most real-world conditions, the effective blast radius would be significantly less. Although the 250 kg FAE aerial bomb is an unguided munition, it can be assumed that competent pilots operating under normal combat conditions will be able to deploy it effectively. The bomb is designed to be carried by fixed-wing aircraft and can be released from low to medium altitudes.

DI 21-made 250 kg FAE bomb as presented in internal Myanmar military documents.



Junta leader Min Aung Hlaing shakes the hand of Chinese President Xi Jinping on the sidelines of Russia's Victory Day celebrations in Moscow on 9 May 2025. (Chinese Ministry of Foreign Affairs)

3. China's Support for the Production of FAE Aerial Bombs in Myanmar

3.1 China's Support to the Myanmar Military

China has long been and remains one of the principal suppliers of arms to Myanmar, second only to Russia.[42] The first recorded arms agreement between China and Myanmar was in 1994 for a 'defence package' worth USD 1.2 billion. It was followed by an additional deal for military equipment estimated to be worth USD 400 million.[43] Since the 1990s, China has steadily increased its supplies of arms and related equipment to Myanmar, in addition to providing technical assistance, training, financing and economic cooperation in the military and arms production sector in Myanmar.

Transfers of arms from China to Myanmar have continued since the junta's attempted coup in February 2021. A May 2023 report by the UN Special Rapporteur on Myanmar found that, between February 2021 and December 2022, the Myanmar military had imported military goods at a total

[42] Conference Room Paper *Billion Dollar Death Trade* May 2023, available at https://www.ohchr.org/sites/default/files/documents/countries/myanmar/crp-sr-myanmar-2023-05-17.pdf. Last accessed 5 June 2025.

[43] NTI *China Missile Chronology* July 2010, available at https://media.nti.org/pdfs/china_missile.pdf. Last accessed 5 June 2025.

value of USD 267 million from entities in China, including state-owned companies.[44] The report noted that China-based companies remained critical to the Myanmar military for transfers of advanced weapon systems and their spare parts, and identified 41 unique suppliers, both private and state-owned companies registered in China, that continued to supply the Myanmar military.[45] Shipment records also confirmed that Chinese firms continued to provide various raw materials to the Myanmar military's arms manufacturing,[46] echoing similar findings made by SAC-M in 2023.[47]

The supply of military aircraft to the Myanmar junta by Chinese arms companies is particularly relevant for DI 21 and its production of aerial bombs because aerial bombs modelled after Chinese munitions, such as those seemingly produced at DI 21 developed with assistance from China South, are likely to be designed to be compatible with Chinese-produced military aircraft and developed in line with Chinese weapon systems, mounting mechanisms and fire control systems.[48]

An investigation published by Justice For Myanmar and Info Birmanie in September 2024 confirmed that companies under the direct oversight of Aviation Industry Corporation of China, a Chinese state-owned company engaged in the design, development and production of military aircraft, continued to supply military aircraft and associated arms to the Myanmar military, including fighter jets, combat aircraft and military transport aircraft used for indiscriminate bombing of civilians.[49] Confirmed supplies since the attempted coup include:[50]

- **Hongdu-Karakorum K-8W light attack aircraft**, assembled under licence in Myanmar since 2009.[51] Recently, K-8W aircraft were commissioned into service by the junta in 2024, 2022 and 2021, adding to an older fleet of K-8W aircraft in active use by the Myanmar Air Force. Before the regular deployment of the Russian Yak-130 in active combat operations in 2022, the K-8 was the junta's most frequently used ground attack aircraft.[52]

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[44] Conference Room Paper *Billion Dollar Death Trade* May 2023, available at https://www.ohchr.org/sites/default/files/documents/countries/myanmar/crp-sr-myanmar-2023-05-17.pdf. Last accessed 5 June 2025.

[45] Conference Room Paper *Billion Dollar Death Trade* May 2023, available at https://www.ohchr.org/sites/default/files/documents/countries/myanmar/crp-sr-myanmar-2023-05-17.pdf. Last accessed 5 June 2025.

[46] Conference Room Paper *Billion Dollar Death Trade* May 2023, available at https://www.ohchr.org/sites/default/files/documents/countries/myanmar/crp-sr-myanmar-2023-05-17.pdf. Last accessed 5 June 2025.

[47] SAC-M, 2023. *Fatal Business: Supplying the Myanmar Military's Weapon Production*. Available at https://specialadvisorycouncil.org/wp-content/uploads/2023/01/SAC-M-REPORT-Fatal-Business-ENGLISH-1.pdf.

[48] While the Myanmar military operates a mix of aircraft from different origins and may attempt to integrate Chinese aerial bombs with non-Chinese platforms, such as Russian military aircraft currently in active use by the Myanmar Air Force, this would typically require custom engineering and systems integration. In addition, while the OCDI, through DI 21, may have requested China South to supply designs and support for in-country production of aerial bombs with modular compatibility in mind, SAC-M considers it reasonable that these efforts would have favored the continued use of military aircraft ordered by the junta and supplied by Chinese arms companies.

[49] Justice For Myanmar and Info Birmanie *#Airbusted 2024*, available at https://cdn.prod.website-files.com/5e691d0b7de02f1fd6919876/66fe38597e5be463bb42eec1_%23Airbusted_EN.pdf.

[50] Summarised from *#Airbusted*, with footnotes omitted. Last accessed 5 June 2025.

[51] Mazumdar, M. and Grevatt, J. *Myanmar Air Force inducts new aircraft* Janes 17 December 2021, available at https://www.janes.com/osint-insights/defence-news/air/myanmar-air-force-inducts-new-aircraft. Last accessed 5 June 2025.

[52] Centre for Information Resilience *Hongdu K-8 Karakorum*, available at https://www.info-res.org/myanmar-witness/guides/k-8/. Last accessed 5 June 2025.

- **FTC-2000G jet trainer/light combat aircraft**, first delivered in November 2022, officially commissioned into service in December 2022. An additional batch of six FTC-2000G aircraft were unveiled in December 2024.
- **JF-17B 'Thunder' multirole combat aircraft**, several of which were commissioned into service between 2018 and 2021.
- **Harbin Y-12 turboprop utility aircraft**, most recently introduced into service by the Myanmar Air Force in 2021 and 2022. According to individuals formerly associated with the junta, the Myanmar Air Force is increasingly relying on the Y-12 for bombardments by manually dropping munitions from the rear of the aircraft.[53]

Transfers of military aircraft and related assistance to Myanmar take place against a backdrop of Chinese political and financial support to the military junta. Since February 2021, China has consistently voted against any meaningful international response, such as a global arms embargo, to the junta's atrocities.

JF-17 Thunder (block II) aircraft, here showcased in June 2020 with two CS/BBF1 aerial bombs attached to its hardpoints.[54] (Sina News)

[53] *Myanmar junta deploys Y-12 aircraft for aerial bombing campaigns* Mizzima 23 September 2024, available at https://eng.mizzima.com/2024/09/23/14284. Last accessed 5 June 2025.

[54] Sourced from https://k.sina.cn/article_6927817734_19cee1c0600100s1vw.html. Accessed 29 September 2024. Archived https://web.archive.org/web/20240929144402/https://k.sina.cn/article_6927817734_19cee1c0600100s1vw.html.

3.2 Assistance From China for DI 21's Development

Evidence obtained by SAC-M confirms that Chinese state-owned companies have been involved in and assisted the development of DI 21 for more than a decade. Support has come principally from the fully state-owned China South and two of its wholly-owned subsidiaries, Chongqing Changan and Hunan Vanguard.[55] Available intelligence and photographic evidence on file with SAC-M confirms that Hunan Vanguard plays a direct role in producing the aerial bombs that are marketed by China South, including various special purpose bombs of the Yunlei series (also marketed with the prefixes LY- and CS/BB-) to which the CS/BBF1 250 kg FAE bomb belongs.

DI 21 engineers have been trained in China. Photographic evidence seen by SAC-M confirms the presence of Myanmar DI engineers, including from DI 21 and DI 4, at production facilities in China of Chongqing Changan as early as 2012. In 2015 and 2019 respectively, groups of DI 21 staff also travelled to China for munitions production training at Hunan Vanguard.

Between 2014 and 2019 technicians from Hunan Vanguard[56] were stationed at DI 21. Photographic evidence obtained by SAC-M confirms their presence in the immediate vicinity of DI 21 and their interaction with senior staff at DI 21.

According to a source directly associated with the Chinese central government, CS/BBF1 FAE aerial bombs were transferred to Myanmar prior to 2015.[57] Information publicly disclosed by China South itself confirms that its president Tang Dengjie met with the head of Myanmar's defence industry, Thein Htay, in September 2015, to discuss Myanmar's cooperation with the company and the introduction of advanced technology and equipment from China South.[58] Based on this, and as this report goes on to show, SAC-M considers it likely that the transfer of CS/BBF1 aerial bombs to Myanmar would have been coupled with, or followed by, a transfer of technology and technical assistance for production in Myanmar.

[55] See Appendix C for background on China South and its subsidiaries.

[56] 湖南云箭集团有限公司, USCC 91431223707465979R.

[57] China Arms Control and Disarmament Association (CACDA). Available for download at archived website: http://www.cacda.org.cn/ueditor/php/upload/file/20150407/1428370391424563.docxAvia.

[58] Archived version of China South's webpage, available at https://web.archive.org/web/20231228134740/https://www.csgc.com.cn/.

CS/BBF1 250 kg FAE aerial bomb on display in 2023. Note the Hunan Vanguard logos on the body of the bomb. Hunan Vanguard is a known producer of the LY- series aerial bombs to which the CS/BBF1 (marketed as LY-402) belongs.[59] (@jesusroman on X)

[59] Image sourced from Twitter account of Jesus Roman, 22 January 2023, available at https://x.com/jesusroman/status/1617083414384877568?lang=en.

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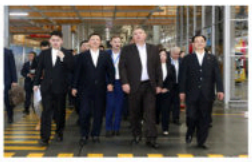
Tang Dengjie Meet with Thein Htay

From:CSGC Updated:2015-11-09 Size AAA

On Sept 22nd, CSGC president Tang Dengjie met with Myanmar National Defense Industrial Committee chairman Thein Htay at headquarters.

Tang Dengjie extended warm welcome to Thein Htay's visit, affirmed the cooperation between CSGC and Myanmar enterprises, and introduced the developing history, leading industry and comprehensive strength of CSGC. Tang Dengjie said, Myanmar and China are both developing countries and friendly neighbors. In the course of pursuing nationalliberation, independence and construction, the both countries understood and learned from each other, which made the relationship long-standing, well-established, and closer.According to the national strategy deployment, CSGC constantly furthered the interaction and cooperation with Myanmar enterprises to form reliable partnership and deeply expanded mutual cooperation to reach the goal of firm foundation, broad field and good prospect.

Thein Htay expressed gratitude to Tang Dengjie's meeting, highly praised the Sino-Myanmar traditional friendship and the support from CSGC to Myanmar's economic and social development, and exchanged the feeling of visiting the enterprises of CSGC. Thein Htay said, according to the history, it was easy to find that CSGC is a reliable, responsible and powerful cooperative partner. Through the on-site investigation, he had seen numerous products, advanced technology and good quality in CSGC enterprises, which made him confident and resolute to the cooperation with CSGC. Myanmar enterprises would fully deepen the cooperation with CSGC, and expect to introduce advanced technology and equipment from CSGC, draw on the successful experience of development, and accelerate self transformation and upgrading to make positive contribution to the national construction.



Russian Deputy Prime...

Linmax - First MPV o...

A screenshot of a description on China South's website of a 2015 meeting between the company's president and the then head of Myanmar's OCDI, Thein Htay.

3.3 Technical Assessment of the Manufacture of FAE Aerial Bombs at DI 21

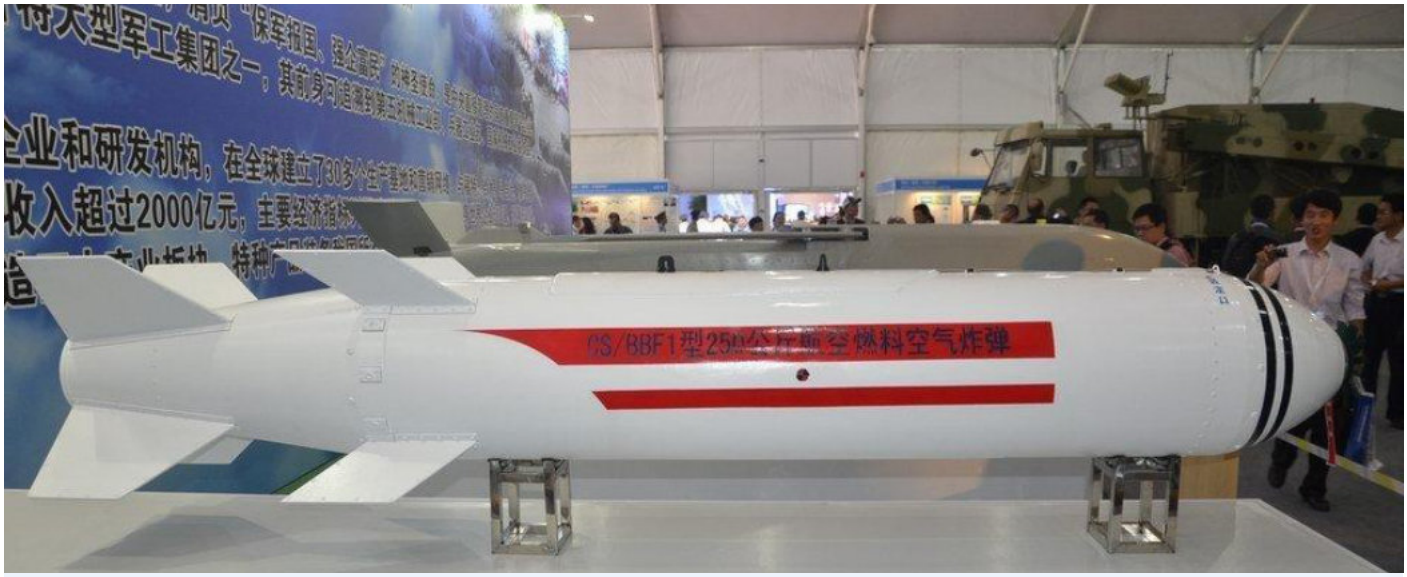
Based both on an assessment of physical characteristics and markings, technical experts concluded with high certainty that the FAE aerial bombs used by the Myanmar Air Force in 2015, 2017 and 2020 were either direct imports of the Chinese CS/BBF1 250 kg FAE aerial bomb or Myanmar-made copies or variants of that bomb. The CS/BBF1 is manufactured by China South (reflected by the prefix CS, for China South). The expert assessment noted that the FAE aerial bombs used in Myanmar could have included Chinese-made weapons imported by Myanmar as complete munitions or bombs that had been partially or wholly made or assembled in Myanmar.[60]

Referring to a photo of a 250 kg FAE aerial bomb being loaded onto a fixed-wing aircraft in Myanmar in 2017, the technical expert assessment noted that the bomb was almost identical to Chinese CS/BBF1 models presented at the 2012 Zhuhai Air Show and marked with 'CS/BBF1 250 kg FAEC Bomb'. The analysis also concluded that other FAE remnants identified in Myanmar feature tailfins that strongly resemble the fin assembly used in the CS/BBF1 (see images below, marked as 'Tail Cabin' on the assembly diagram) and one example (image below) from 2017 depicting a munition body explicitly marked with 'CS/BBF1' (as well as 'AH-21', the designation for the fuze assembly used in each of the two submunitions dispersed by the CS/BBF1 munition).

As stated above, the Myanmar 250 kg FAE aerial bomb contains two FAE submunitions ('bomblets') which make up its payload. According to Chinese defence intelligence sources, the CS/BBF1 also contains two FAE submunitions inside a carrier munition. The images below illustrate the similarities between the Myanmar-produced aerial bomb and the CS/BBF1 aerial bomb produced by China South. The expert analysis concluded that the 250 kg FAE aerial bomb manufactured at DI 21 is almost certainly derived directly from the Chinese CS/BBF1.

[60] Documents by the China Arms Control and Disarmament Organisation confirm that the CS/BBF1 FAE bomb, which was first showcased by China South at the 2012 Zhuhai airshow, was first used by the Myanmar Air Force in March 2015. Available for download at archived website: http://www.cacda.org.cn/ueditor/php/upload/file/20150407/1428370391424563.docxAvia. According to human sources in the Myanmar Air Force, in the context of protracted fighting against an ethnic army, an FAE aerial bomb deployed with A-5 aircraft was presented as 'Myanmar-made' in at least one instance.

A 250 kg FAE aerial bomb with markings CS/BBF1 being loaded onto an A-5 aircraft at the Tada-U Myanmar Air Force Base in 2017.[61](The Irrawaddy)



CS/BBF1 FAE aerial bomb showcased by China South at the 2012 Air Zhuhai Air Show.[62] (Phoenix New Media/iFeng)

[61] The Irrawaddy *How China, Russia, keep the Myanmar Junta's Deadly Aerial Campaign Aloft* 12 June 2023, available at https://www.irrawaddy.com/news/burma/how-china-russia-keep-myanmar-juntas-deadly-aerial-campaign-aloft.html. Accessed 27 September 2024.

[62] Ifeng.com, Zhuhai Air Show 2012 recap, including photos of presented products by China South. Available at https://news.ifeng.com/mil/special/zhuhaihangzhan2012/?_from_ralated. Archived: https://web.archive.org/web/2/https://news.ifeng.com/mil/special/zhuhaihangzhan2012/?_from_ralated.

An assembly diagram for a Myanmar-made FAE aerial bomb as featured in official Myanmar military technical documents. Note the two submunitions (marked as 'Bomblet-1' and 'Bomblet-2').

According to Chinese defence intelligence sources, the CS/BBF1 also contains two FAE submunitions inside a carrier munition. Weapon experts conclude that this bomb is almost certainly derived directly from the CS/BBF1.

A remnant bomblet from an FAE aerial bomb deployed by the Myanmar Air Force in January 2017, reportedly against the KIA.

The bomblet is clearly marked with 'CS/BBF1' and 'AH-21', the latter being the very same fuze that is also used in the DI 21-made 250 kg FAE aerial bomb. (Source redacted due to privacy concerns)

The CS/BBF1 FAE aerial bomb marketed as 云雷-3 (Yunlei-3) showcased by China South. A technical assessment commissioned by SAC-M concluded that the Myanmar-made 250 kg FAE bomb is almost certainly directly derived from the China South-made CS/BBF1.[63] (People's Daily)

While the OCDI has a known track-record of reverse engineering, technical experts concluded, with high confidence, that the FAE bombs manufactured at DI 21 were not reverse engineered.[64] The munition is relatively complex, making reverse engineering extremely difficult and therefore all the more unlikely. Technical experts concluded, with high confidence, that external technical assistance was both required and accessed by the Myanmar military to establish 250 kg FAE bomb production at DI 21 and that DI 21 has received schematics, training and other technical assistance from China.

[63] Models of the CS/BBF1 have been seen marked with 云雷-3 ('Yunlei-3') which may be a domestic variant, although the Chinese military is known to utilise both import and export variants of many munitions. Armament Research Services (ARES) *ARES assessment: purported fuel air-explosive munitions in Burma* 26 January 2024. Photo sourced from people.cn (2014), available at http://military.people.com.cn/BIG5/n/2014/1111/c1011-26006767-4.html. Archived: https://web.archive.org/web/20240927100625/http://military.people.com.cn/BIG5/n/2014/1111/c1011-26006767-4.html.

[64] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* January 2023, available at https://specialadvisorycouncil.org/2023/01/new-sac-m-report-fatal-business/ .

3.4 Technical Assessment of Additional Aerial Bombs Manufactured at DI 21

Initial analysis by SAC-M of technical data on several of the other aerial bombs manufactured by DI 21 and China South shows significant similarities. The bombs appear to be almost identical in terms of physical characteristics (including measurements and placement of lugs and rivets), functions and operating principles. The munitions are also described in exactly the same way in marketing materials by China South and in leaked OCDI documents concerning DI 21 production.

Leaked data also suggests that key components for at least five of the bombs produced at DI 21 – the 250 kg FAE bomb, the 250 kg low drag bombs (high altitude and low altitude) and the 500 kg low drag bombs (high altitude and low altitude) – carry markings indicating that they may have been manufactured by Chongqing Changan.

As has already been noted, credible testimonies by several sources and photographic evidence seen by SAC-M also suggests that technicians from China South's aviation munition research institute, Hunan Vanguard, have supervised the entirety of production lines on-site at DI 21. Engineers from DI 21 who travelled to Hunan Vanguard for munitions production training in 2019 were reportedly working on all aerial bomb production at DI 21, as opposed to working only on the FAE bombs. Taken together, this confirms the role of both Chongqing Changan and Hunan Vanguard in enabling the manufacture of multiple aerial bombs currently manufactured at DI 21.

Internal Myanmar military documents describe two of the aerial bombs manufactured at DI 21 as being 'similar in nature and usage' to the 250-3 and 250-4 type aerial bombs used by the Chinese People's Liberation Army Air Force (PLAAF).[65] While many Chinese arms companies are likely manufacturing 250-3 and 250-4 type aerial bombs for the PLAAF, SAC-M notes that models of the 250-3 and the 250-4 closely resembling the Myanmar-made munitions were showcased by China South at the 2012 Zhuhai Air Show, where the CS/BBF1 FAE bomb was also presented for export.[66] Chinese media reported that a Myanmar delegation was present, listening to sales pitches of various Chinese arms companies.[67]

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[65] Defence intelligence reporting on PLAAF general-purpose aerial bombs confirms that in the early 1990s a new series of streamlined, low drag general-purpose bombs was introduced. These bombs were designed for external carriage by fighter-bomber aircraft, rather than in internal bays of the aircraft. The bombs were reported to come in three sizes, 250 kg, 500 kg and 1000 kg, and to have what Chinese defence analysis referred to as 'Western type' stabilizing fins at the tail. The PLAAF designation for general-purpose bombs normally consists of the bomb's nominal weight in kilograms (250, 500 or 1000 kg), followed by a single digit indicating the different series/generation. See Global Mil *General-Purpose bombs* 15 January 2017, available at http://www.globalmil.com/military/air_force/china/systems/unguided/2017/0115/379.html. Archived: https://web.archive.org/web/2/http://www.globalmil.com/military/air_force/china/systems/unguided/2017/.

[66] People.com.cn, 2012. Picture report from the 2012 Zhuhai Air Show. Available at http://military.people.com.cn/GB/8221/61117/350262/350264/index3.html. Accessed 27 September 2024. Archived: https://web.archive.org/web/20240927101238/http://military.people.com.cn/GB/8221/61117/350262/350264/index3.html.

[67] Sina News 14 November 2012, available at https://news.sina.com.cn/c/2012-11-14/235025582080.shtml. Accessed 27 September 2024. Archived: https://web.archive.org/web/20240927120104/https://news.sina.com.cn/c/2012-11-14/235025582080.shtml.

Documents by China Arms Control and Disarmament Organisation obtained by SAC-M indicate that the tail unit of the CS/BBF1 FAE bomb can be used with other aerial bombs, notably the 250-3, significantly reducing production costs.[68] Human sources have confirmed this design choice at DI 21, noting that the OCDI has sought to manufacture aerial bombs whose key parts and components were interchangeable to increase production effectiveness and save costs. For illustrative and comparative purposes, photos of China South munitions (250-3 and 250-4) and diagrams of two Myanmar-made 250 kg aerial bombs (reproduced from leaked technical OCDI documents in possession of SAC-M) are included below.[69]

> DI 21-manufactured aerial bombs, in particular domestically produced 250 kg aerial bombs, continue to be widely used by the Myanmar Air Force in indiscriminate attacks on civilians.

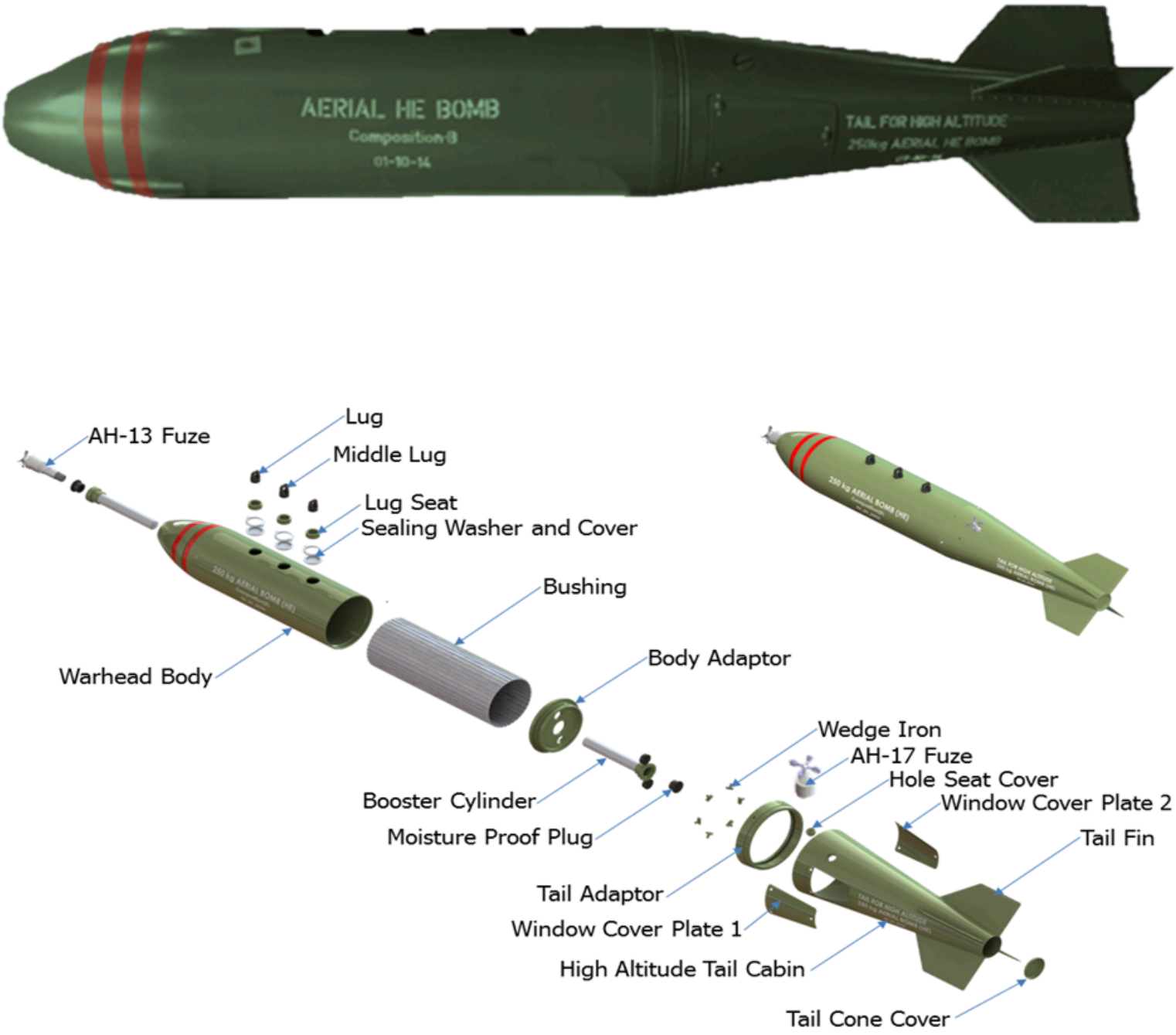
[68] China Arms Control and Disarmament Association (CACDA) is an organisation based in Beijing that is technically independent of the Chinese Government but closely aligned with it in policy. Documents on file with SAC-M.

[69] Note that in the China South-manufactured bombs in the photos do not have a middle lug whereas the bombs as presented in the leaked OCDI documents do. SAC-M notes, however, that the 'missing' lug seat is easily visible in the China South-manufactured bombs showcased in 2012.

250-3 general purpose aerial bombs (both images) manufactured by China South on display at the 2012 Zhuhai Air Show. (Top: People's Daily[70], bottom: inf.news[71])

[70] Photo sources from world.people.com.cn/n/2012/1115/c244015-19595507-4.html. Archived: https://web.archive.org/web/20240927120700/http://world.people.com.cn/n/2012/1115/c244015-19595507-4.html.

[71] Photo sourced from https://p4.itc.cn/images01/20220330/211a66d0d76a41fba5b35394b5809154.jpeg. Archived: https://web.archive.org/web/20240927120832/https://p4.itc.cn/images01/20220330/211a66d0d76a41fba5b35394b5809154.jpeg.

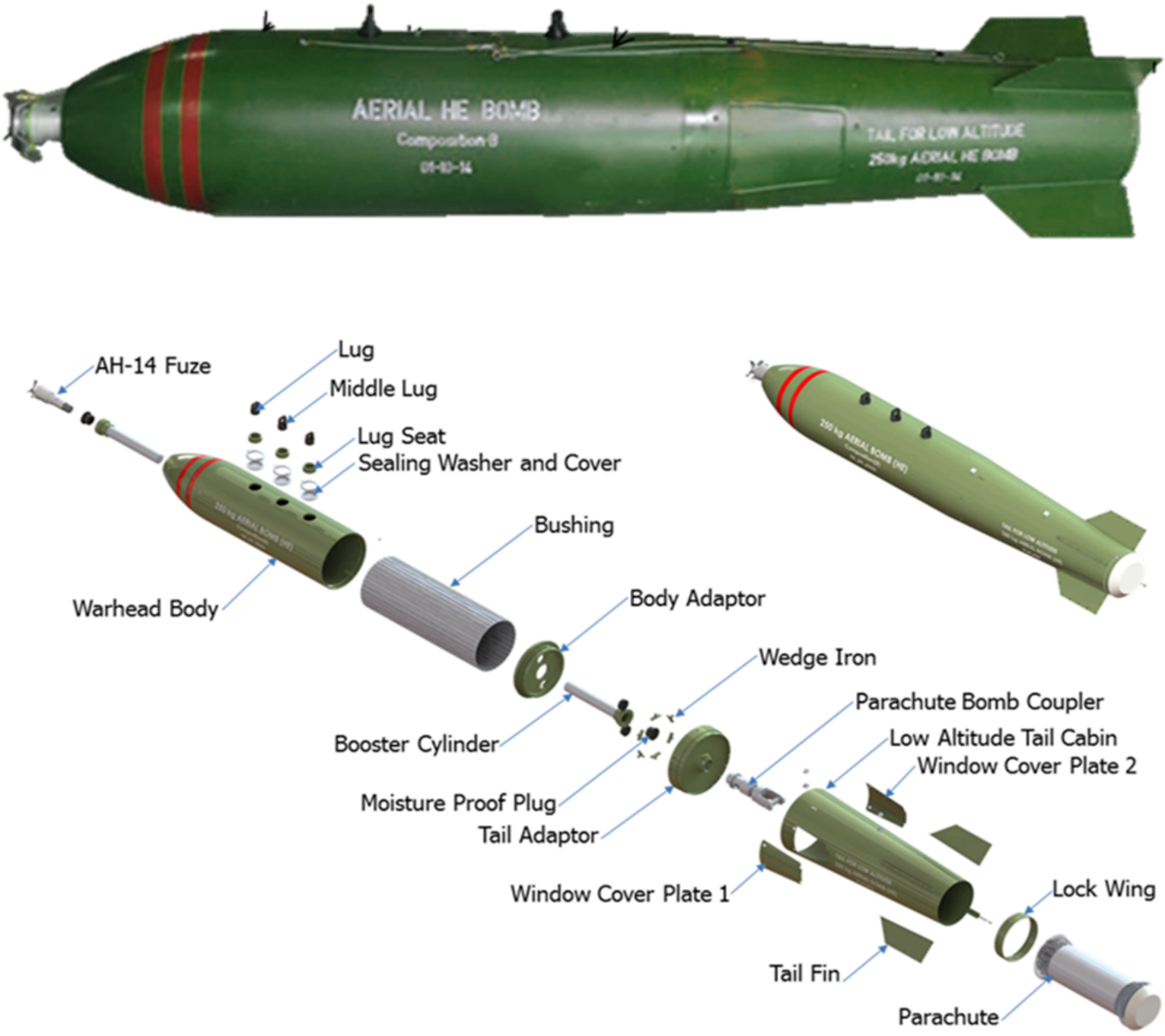


A diagram of a Myanmar-made 250 kg low drag, high altitude aerial bomb produced at DI 21 as featured in official Myanmar military documents. 250 kg aerial bombs continue to be widely used by the Myanmar Air Force in indiscriminate attacks on civilians.

250-4 general purpose aerial bombs (both images) manufactured by China South on display at the 2012 Zhuhai Air Show. (Top: People's Daily[72], bottom: mil.sina.cn[73])

[72] Photo sources from http://world.people.com.cn/n/2012/1115/c244015-19595507-5.html. Archived: https://web.archive.org/web/20240927121216/http://world.people.com.cn/n/2012/1115/c244015-19595507-5.html.

[73] Photo sourced from https://mil.sina.cn/sd/2018-05-07/detail-ifzfkmth9994918.d.html. Archived: https://web.archive.org/web/20240927220158/https://mil.sina.cn/sd/2018-05-07/detail-ifzfkmth9994918.d.html.



A diagram of a Myanmar-made 250 kg low drag, low altitude aerial bomb produced at DI 21 as featured in official Myanmar military documents. The documents describe this model and the above model of bombs as being 'similar in nature and usage' to the 250-3 and 250-4 type aerial bombs used by the Chinese People's Liberation Army Air Force (PLAAF). The DI 21-made 250 kg low drag, low altitude bomb shows striking similarities to the 250-4 bomb manufactured and marketed by China South. Sources have confirmed that Hunan Vanguard has assisted Myanmar in establishing production of 250 kg low drag, high altitude and 250 kg low drag, low altitude aerial bombs.

Internal Myanmar military munitions production documents also note that the DI 21-made 250 kg bombs (both low drag, high altitude and low drag, low altitude) are intended to be used with the Chinese-origin F-7 (Chengdu J-7) fighter aircraft,[74] the A-5 (Nanchang Q-5) ground-attack aircraft[75] and the K-8 (Hongdu-K-8 Karakorum) light attack aircraft.[76] All three aircraft are currently in the inventory of the Myanmar Air Force and at least two of them – the A-5 aircraft and the K-8 aircraft – have been used to deploy Chinese-made 250 kg FAE bombs (CS/BBF1) and 250 kg low drag bombs, respectively, in Myanmar.[77]

Consistent with the conclusion in relation to the production of the 250 kg FAE aerial bomb, SAC-M considers it highly unlikely that production of the aerial bombs at DI 21 has been established and maintained through a process of reverse engineering. Rather, technical assistance from the designer and manufacturer of the original bombs, China South, would have been required.

3.5 Technical Assessment of Origin of Component Parts

A list of documents, in SAC-M's possession, concerning the production of aerial bombs at DI 21, confirms that the OCDI is fully reliant on external supplies for many components of the bombs, including micro-electronics.[78] This aligns with the conclusions of the technical expert assessment of DI 21's FAE bomb specifically, namely that fully indigenous production was less likely than production taking place with continued assistance in some form.[79] SAC-M considers that the need for foreign material supplies for DI 21 aerial bomb production continues because the significant supply chain dependencies of the OCDI, notably for micro-electronics, are unlikely to have been addressed since 2019.

While many of the supply chain dependency items are dual-use and may have legitimate uses in

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[74] The Myanmar Air Force has operated a substantial fleet of J-7 aircraft (including 48 F-7IIK (Chengdu J-7) aircraft) since the early 1990s. According to a May 2023 report by the UN Special Rapporteur on Myanmar, suppliers registered in mainland China delivered various spare parts for F-7IIK aircraft to Myanmar between February 2021 and December 2022, confirming their continuing use by the Myanmar Air Force. See UN Special Rapporteur on Myanmar *Billion Dollar Death Trade* Conference Room Paper, May 2023, available at https://www.ohchr.org/sites/default/files/documents/countries/myanmar/crp-sr-myanmar-2023-05-17.pdf. Accessed 27 September 2024.

[75] The Myanmar Air Force reportedly commissioned into service a total of 36 A-5 III aircraft between 1994 and 2000.

[76] The Myanmar Air Force is reported to have a total of 50 K-8 aircraft, with a first batch having arrived in Myanmar in 1998-99. Information shared with SAC-M confirms that K-8 aircraft have been locally assembled at the Meiktila airbase in central Myanmar under a 2009 transfer of technology agreement between Myanmar and the China National Aero-technology Import and Export Corporation. At least one locally assembled K-8 aircraft was commissioned into service with the Myanmar Air Force as recently as 2021, and Myanmar air force engineers are reported to have been trained by Aviation Industry Group Corporation of China, the parent company of the China National Aero-technology Import and Export Corporation, in China as recently as September 2023. Before the regular deployment of the Russian Yak-130 in active combat operations starting from April 2022, the K-8 aircraft was the most frequently used ground attack jet of the Myanmar Air Force. See Myanmar Witness *Hongdu K-8 Karakorum profile* undated, available at https://www.myanmarwitness.org/aircraft/k-8. Accessed 27 September 2024.

[77] The Irrawaddy *How China, Russia, keep the Myanmar Junta's Deadly Aerial Campaign Aloft* 12 June 2023, available at https://www.irrawaddy.com/news/burma/how-china-russia-keep-myanmar-juntas-deadly-aerial-campaign-aloft.html. Accessed 27 September 2024.

[78] A full list of import dependencies is on file with SAC-M and will be communicated to relevant investigative mechanisms and authorities for future export control purposes.

[79] See Appendix A.

many civilian sectors, at least some are branded and marketed as Chinese 'military grade', confirming that the manufacturer or manufacturers are based in China.[80] Photos of several components in various munitions production documents concerning DI 21 also carry visible text in Chinese.

The technical expert assessment commissioned by SAC-M evaluated markings observed on several FAE aerial bombs used by the Myanmar Air Force. The assessment concluded that the markings '01-12-21' could be indicative of Chinese manufacture, as they follow common Chinese munitions marking format (which includes, for the second and the third digits, LOT NUMBER-YEAR-FACTORY CODE'). The analysis concluded that the munition may have been produced at the facility of Chongqing Changan (reflecting its former name, the 21st Arsenal Artillery Factory, hence the -21).[81]

Similar markings are visible in leaked OCDI documents concerning key components for at least five of the aerial bombs manufactured at DI 21: the 250 kg FAE bomb, the 250 kg low drag bombs (both low altitude and high altitude versions) and the 500 kg low drag bombs (low altitude and high altitude version models). The marking includes the reference '-21' which could, in theory, refer to DI 21. However, this is considered unlikely as it is not the way the OCDI typically marks its munitions or associated components.[82] The items reproduced below from leaked materials also predate 2021, suggesting '-21' does not refer to year but to factory. Put differently, the components from munitions production documents from DI 21 bear markings which are consistent with lot number patterns observed on Chinese munitions, indicating the origins of the models upon which DI 21 production of the same components is based.

> The OCDI is entirely dependent on foreign material supplies—including micro-electronics—for many of the components used in bombs manufactured at DI 21.

[80] The term 'military grade' is used for marketing purposes to suggest higher levels of toughness, durability and quality and to indicate that the product marketed as 'military grade' has been tested and approved as such.

[81] 重庆长安工业（集团）有限责任公司. USCC 915000002028148546. Breevoort, L *The Big Read: History of Changan* Car News China 25 July 2021, available at https://carnewschina.com/2021/07/25/the-big-read-history-of-changan/. Archived: https://web.archive.org/web/20240910153908/https://carnewschina.com/2021/07/25/the-big-read-history-of-changan/.

[82] OCDI typically marks munitions and components it produces by number of lot/date/month/year of production and does not include any markings suggesting at which DI factory a munition or component has been made.

Chinese text is visible on a purchased product intended for fuze production, as shown in internal Myanmar military documents related to the manufacture of aerial bombs.

Chinese text is visible on a marking belt of a tail fuze for a 250 kg low drag, high altitude bomb made at DI 21, as shown in internal Myanmar military documents.

Remnant of submunition of FAE bomb dropped by the Myanmar Air Force on the Myanmar-China border in 2015. Note the same markings on the body (CS/BBF1 and 01-12-21) as on the intact submunition (bomblet) recovered in 2017 pictured on page 32. (Kokang123.com)

A Chinese PF-69 40 mm HEI projectile, marked with the standard LOT NUMBER-DATE-FACTORY marking scheme used on Chinese munitions ('7-15-23'). Experts believe the '01-12-21' markings visible in the photos above follow this common marking scheme, which could indicate the munitions are of Chinese manufacture. (ARES CONMAT Database)

4. Recommendations

To United Nations Organs

To the Security Council

Adopt a new resolution on the situation in Myanmar to

- impose an immediate compulsory humanitarian ceasefire in Myanmar and include provisions to enforce the Myanmar military's compliance with the ceasefire
- impose a comprehensive Security Council arms embargo, including banning the sale, transfer and diversion to the Myanmar military of arms, munitions and other military equipment and components for arms production and prohibiting the sale, transfer, provision and licensing of intellectual property and technical design for the production of arms and munitions
- prohibit military technical assistance or other forms of support that risk enhancing the Myanmar military's capacity to carry out aerial strikes
- urge ASEAN, UN entities, other states and international organisations to urgently deploy humanitarian aid, including medical assistance, by land, air and sea, including through cross-border channels, in conjunction with the NUG, ethnic and civil society organisations capable of reaching communities most in need
- call for scaled-up financial support to Myanmar to address needs following the March Sagaing earthquakes and the broader humanitarian crisis in Myanmar
- formally place Myanmar on the Security Council's agenda through a regular reporting mechanism

To the General Assembly

Adopt a new plenary resolution on the situation in Myanmar, building on and further developing resolutions of the Security Council and the Human Rights Council, including incorporating the elements in the recommended new resolution by the Security Council

Recognise the Myanmar National Unity Government as the Government of the Republic of the Union of Myanmar and accredit its representatives as the full representatives of Myanmar in United Nations organs and bodies

To the International Criminal Court and the Independent Investigative Mechanism for Myanmar

Investigate companies and individuals who may be responsible as accomplices to the Myanmar military's crimes by providing support for or assistance to the Myanmar

military's arms production industry

Determine expeditiously applications by the Prosecutor for warrants for the arrest of Myanmar military and political leaders suspected of the commission of war crimes and crimes against humanity

To Governments

Undertake an audit of all contacts from their individual states with the Myanmar military and prohibit any support for or assistance to the Myanmar military's arms production industry

Act to ensure that the OCDI can no longer access technical assistance and foreign components and supplies, in particular micro-electronics, for the continued production of aerial bombs and other arms in Myanmar

Prosecute locally against any company registered in or operating from their individual states, including companies identified in this report, for aiding and abetting the commission of war crimes by the Myanmar military

Act to end the military's grave violations and abuses of international human rights and humanitarian law and to ensure that all those responsible for such violations and abuses can be tried and held accountable through criminal trials in properly constituted tribunals

Cooperate fully with all properly constituted courts and mechanisms, including the International Court of Justice, the International Criminal Court, the Independent Investigative Mechanism for Myanmar and national courts and mechanisms exercising universal jurisdiction, such as courts in Argentina and Türkiye, in their investigations of and proceedings against the Myanmar military, including by enforcing arrest warrants and other orders of the courts

To Democratic Resistance Organisations in Myanmar

Consider the strategic importance and value to the Myanmar military of all DI factories, including DI 21, in light of this SAC-M report

Evaluate the potential impact on the DI's arms production if supplies and components going into DI factories, including DI 21, were to be restricted

Assess the effect on the Myanmar military if the DI factories' capability to transport finished products out to aerial launch facilities was to be undermined

In the event DI personnel are held captive, treat them humanely in accordance with the

1949 Geneva Conventions, specifically, the requirements of Common Article 3 and Additional Protocol II, which provide protections for people deprived of their liberty for reasons related to a non-international armed conflict who may not be afforded the status of a Prisoner of War

Support the work of the International Criminal Court and/or the Independent Investigative Mechanism for Myanmar in responding to any cooperation requests for access to captured DI 21 personnel, documents or other items that may assist in their criminal investigations into Myanmar military leaders

5. Conclusion

On 1 February 2021 the Myanmar military attempted its coup to impose full military dictatorship on Myanmar's peoples. SAC-M was formed at that time to support the democratic resistance to the attempted coup, including the National Unity Government, the ethnic resistance organisations, the Civil Disobedience Movement, the General Strike Committees and the other resistance organisations and groups. From its very beginning SAC-M called for a Three Cuts Strategy in response to the military's crimes: cut the weapons, cut the cash and cut the impunity. SAC-M has continued to advocate these Three Cuts since then.

There are two dimensions to cutting the weapons: stopping the sale and transfer of arms and munitions and jet fuel to the Myanmar military and stopping the domestic production of weapons and armaments for the military in Myanmar. SAC-M examined the second dimension, domestic production, in its earlier report *Fatal Business: Supplying the Myanmar Military's Weapon Production*.[83] It has taken this research further in this report.

More than four years after attempting its coup, the Myanmar military is continuing to wage its losing war against the peoples of Myanmar. As it loses more and more territory, it is resorting increasingly to aerial bombardment as a collective punishment on those who oppose it. It has always been brutal in its suppression of the aspirations of the people but its brutality has been unbounded over the last four years. Myanmar's peoples cry out for basic freedoms, true peace and real justice.

SAC-M reiterates, with even greater urgency, its call for the Three Cuts. It urges all actors – the United Nations and its organs and other bodies, international and national courts and tribunals and accountability mechanisms, individual states and businesses – to identify how they can help to cut the weapons, cut the cash and cut the impunity and so contribute to the victory of Myanmar's peoples.

[83] Special Advisory Council for Myanmar *Fatal Business: Supplying the Myanmar Military's Weapon Production* 2023 at https://specialadvisorycouncil.org/fatal-business/report/.

APPENDICES

Appendix A

Thermobaric Weapons and Fuel Air Explosive Munitions

The terms 'thermobaric and 'fuel air explosive' munitions'are often used interchangeably by many frontline sources in Myanmar. Sometimes, the term 'incendiary weapon' is also conflated with these munitions. However, thermobaric, fuel air explosive and incendiary weapons are not the same and they each have different operating principles and physical characteristics. Fuel air explosive weapons are a type of thermobaric weapon but there are other types of thermobaric weapons as well. Incendiary weapons are completely different.

A wide range of terminology is applied to these weapon types. They are often defined and understood inaccurately, even by specialists, leading to significant confusion in reporting on their use.[84] In particular, the lack of understanding of the FAE bomb and its unique distinctive features has at times led to social media users posting images of FAE bombs and incorrectly referring to them as something else, including chemical weapons, cluster munitions or incendiary weapons, or posting images of other weapons and incorrectly identifying them as FAE bombs.[85]

Thermobaric Weapons

The past decades have seen the emergence of increasingly sophisticated blast munitions which have enhanced effects compared to conventional high explosive munitions.[86] Among these are thermobaric weapons, which contain explosive payloads designed to detonate in a way that maximises both heat and blast effects on targets by utilising ambient oxygen from the surrounding air.

Thermobaric weapons are characterised by larger fireballs, longer blast durations and larger blast radii than conventional high explosive munitions, achieved by using relatively oxygen-deficient explosives that, unlike those compositions used in standard warheads, release their energy comparatively slowly after detonation. Thermobaric compositions continue to mix with the oxygen in the environment, creating after-burning products in the air. Despite their lower detonation velocity, lower peak pressure and limited fragmentation relative to conventional warheads, thermobaric munitions are particularly useful against fortified structures due to their longer blast impulse (a firm

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[84] Armament Research Services (ARES) *ARES assessment: purported fuel air-explosive munitions in Burma* 26 January 2024.

[85] Incendiary munitions are designed to generate primarily thermal effects, damaging the target through heat and combustion (either from the combustion of its payload or ignition of objects in the environment). While high and/or low explosives are often incorporated into these munitions, their presence is to ignite and/or disperse the payload. The primary payload of incendiary weapons deflagrates (combusts), in contrast to that of both thermobaric and FAE weapons which detonate (explode). Some common incendiary payloads include liquid fuels, thickened fuel gels, such as napalm, and flammable metals, such as thermite and magnesium. Armament Research Services (ARES) *ARES assessment: purported fuel air-explosive munitions in Burma* 26 January 2024.

[86] Turker, L *Thermobaric and volumetric explosives (TBX and EBX)* Defence Technology 12 (2016), pp 423-445, available at https://www.researchgate.net/publication/308842264_Thermobaric_and_enhanced_blast_explosives_TBX_and_EBX. Accessed 26 September 2024.

'push' rather than a quick 'snap'). The blast wave caused by thermobaric munition can diffract around corners, rapidly expanding and filling a structure, and is enhanced by reflection in enclosed spaces. Because of this effect, thermobaric munitions are popular weapons of choice for targeting fortified areas, tunnel systems and individual defensive fortifications.[87]

The medical effects on victims of these weapons is principally due to the primary blast, affecting organs with a tissue interface of varying densities, such as the lungs, bowel and inner ear.[88] In particular, exposure to the long-enduring pressure caused by the blast often leads to severe internal injuries such as lung rupture.[89] Because of this, thermobaric weapons are sometimes referred to, colloquially and incorrectly, as 'vacuum bombs' because, in a literal sense, they may 'suck the air from the lungs'.

The use of thermobaric weapons often results in a high number of casualties with burns and crush-, translational- and penetrating-fragment injuries from demolished buildings. Secondary harm may also occur due to fragmentation, the consumption and depletion of ambient oxygen and the release of toxic gases and smoke.[90]

Thermobaric munitions come in many forms, including air-delivered bombs, thrown munitions, projectiles (both mortar and artillery gun varieties) and warheads that are integrated with existing delivery systems, such as shoulder-launched or multiple-barrel mobile rocket launchers or ground- or air-launched missiles.[91]

Fuel Air Explosive Munitions

An important sub-category of thermobaric munitions is fuel air explosive (FAE) munitions. The terms 'thermobaric' and 'fuel air explosive' tend to be used interchangeably by many observers, especially media and human rights organisations. However, they are distinct and have differing operating principles and physical characteristics.

An FAE munition uses an initial explosive charge to rupture the munition's casing and rapidly disperse its payload (a liquid, solid or aerosolised fuel) into a cloud. This payload mixes with atmospheric oxygen and reaches a detonatable state. Milliseconds later, a secondary explosive charge detonates

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87 Human Rights Watch Chechnya Conflict: Use of Vacuum Bombs by Russian Forces Backgrounder on Russian Fuel Air Explosives 1 February 2000, available at https://www.hrw.org/news/2000/02/01/chechnya-conflict-use-vacuum-bombs-russian-forces. Accessed 26 September 2024.

88 Andrew, D *Munitions – Thermobaric Munitions and their medical effects* Journal of Medical Veteran Health Volume 12, No. 1, 2003, available at https://jmvh.org/article/munitions-thermobaric-munitions-and-their-medical-effects/. Accessed 26 September 2024.

89 Andrew, D *Munitions – Thermobaric Munitions and their medical effects* Journal of Medical Veteran Health Volume 12 No. 1, 2003, available at https://jmvh.org/article/munitions-thermobaric-munitions-and-their-medical-effects/. Accessed 26 September 2024.

90 Lopez, E *Will thermobaric weapons overwhelm the military health system?* 8 August 2018, published for the War Room/US Army War College, available at https://warroom.armywarcollege.edu/articles/will-thermobaric-weapons-overwhelm-the-military-health-system/. Accessed 25 September 2024.

91 Van Coller, A *Detonating the air: the legality of the use of thermobaric weapons under international humanitarian law* International Review of the Red Cross No. 923, June 2023, available at https://international-review.icrc.org/articles/detonating-the-air-the-legality-of-thermobaric-weapons-under-ihl-923. Accessed 12 September 2024.

the cloud. The blast wave, although slower than that from a conventional high explosive munition, has a significant effect due to its longer duration. Like most thermobaric munitions, the blast radius and fireball of an FAE munition are significantly larger than a conventional high explosive munition. Indeed, the size of the blast, duration of pressure peak and effectiveness within the target area of FAE munitions can generally be thought of as superior to standard thermobaric munitions. However, a key characteristic of modern FAE munitions is the two-stage fusing mechanism which can reduce reliability. FAE munitions, particularly air-delivered bombs and submunitions, are designed to function above, but close to, the ground to optimise their effects.

Appendix B

The Myanmar Military's Use of FAE Aerial Bombs

SAC-M commissioned experts to examine photographic evidence of the use of FAE and other thermobaric aerial bombs in Myanmar. They established three occasions on which FAE bombs were used, in 2015, 2017 and 2020. Our findings should not be interpreted as comprehensive but as indicative of the use of these weapons. SAC-M considers it likely that the junta has made use of thermobaric munitions, including FAE aerial bombs, on many more occasions than those listed in this report. While the junta has a pattern of denying attacks altogether or accusing other parties to the conflict, no other armed entity in Myanmar has the means or capabilities to deploy air-delivered thermobaric, including FAE, bombs.

In March 2015 Myanmar media reported that authorities in the southwestern Chinese province of Yunnan were investigating multiple aerial bombs, including unexploded bombs, that had landed on the Chinese side of the Myanmar-China border and killed Chinese civilians. The bombs had been dropped by the Myanmar Air Force in the context of protracted fighting during the Kokang offensive.[92] Two separate airstrikes by the Myanmar Air Force were reportedly carried out with FAE bombs. According to eyewitnesses, a total of five FAE bombs were dropped, three of which landed in Myanmar and two in China close to the Mengdui township near Lincang city in Yunnan. Remnants of the bombs were uncovered in the fighting area on the border in March 2015. Additional photos from the Chinese side of the border show white-coloured remnants of fins, some with parachutes still attached. In response to the incident, the Chinese authorities deployed fighter jets, troops and armoured vehicles to the border area.[93] In a statement published by Myanmar military media mouthpiece the Global New Light of Myanmar, the junta suggested that the Kokang insurgency group could have been responsible for the attack to undermine Myanmar-China relations and create instability along the border area.[94] Later the junta admitted that the military airstrike that killed Chinese civilians had been accidental and that the intended target of the bombs was the tunnel systems built by Kokang forces in the border area.[95] In April 2015 officials of the Myanmar

[92] The Kokang offensive was a series of military operations launched by the Myanmar Army in 2015 in Kokang in northern Shan state, involving several clashes between the military and the Myanmar National Democratic Alliance Army (MNDAA) from February to May 2015. The Arakan Army (AA), the Ta'ang National Liberation Army (TNLA) and the Kachin Independence Army (KIA) were fighting alongside the MNDAA.

[93] Sino Defence Forum, online discussion dated 13 March 2015, available at https://www.sinodefenceforum.com/t/sino-myanmar-border-conflicts.7241/. Accessed 26 September 2024.

[94] Associated Press *Myanmar army blames ethnic rebels for shelling inside China* 19 March 2015, available at https://apnews.com/general-news-0e21cc6310af490ab2fdb0a8adf0f93e.

[95] Voice of America *Myanmar admits warplane accidentally killed Chinese civilians* 2 April 2015, available at https://www.voanews.com/a/myanmar-admits-warplane-accidentally-killed-chinese-farmers/2703827.html. C-Readers 'The Myanmar government issued an official communiqué for the bomb that fell on the Chinese side of the border' 2015, translated from the Chinese and available at https://news.creaders.net/world/2015/03/16/1503910.html. Accessed 10 September 2024. Archived: https://web.archive.org/web/20240926193549/https://news.creaders.net/world/2015/03/16/1503910.html.

government and the military visited China to issue a formal apology.[96] A joint investigation by a Chinese and Myanmar military team also took place, although very little information was released to the public. According to information from state-run Chinese media outlets, the Chinese government actively sought to disassociate itself from the conflict, reportedly warning outsiders not to take 'any premature stance or interference' in Myanmar's internal affairs.[97]

The tail and parachute of an FAE bomb that was dropped by the Myanmar Air Force during the Kokang offensive and landed on Chinese territory near Myanmar in March 2015.[98] (Kokang123.com)

[96] Social media post uploaded onto Weibo 16 March 2015, available at https://weibo.com/p/1001603843099775361426?pids=Pl_Official_CardMixFeedv6__4&feed_filter=1. Accessed 26 September 2024. Archived: https://web.archive.org/web/20240926193917/https://weibo.com/p/1001603843099775361426?pids=Pl_Official_CardMixFeedv6__4&feed_filter=1.

[97] Online discussion at Sino Defence Forum relating to the March 2015 bombings. See https://www.sinodefenceforum.com/t/sino-myanmar-border-conflicts.7241/page-2. Archived: https://web.archive.org/web/2/https://www.sinodefenceforum.com/t/sino-myanmar-border-conflicts.7241/page-2.

[98] Democracy for Burma 16 March 2015, available at https://democracyforburma.wordpress.com/category/china/. Archived onto the Wayback Machine: https://web.archive.org/web/20230606235102/https://democracyforburma.wordpress.com/category/china/. See also https://superlife.ca/news/detail/%E6%83%A8%E9%81%AD%E6%89%93%E8%84%B8-%E7%BC%85%E7%94%B8%E5%A4%A7%E5%A8%81%E5%8A%9B%E7%82%B8%E5%BC%B9%E5%86%8D%E8%90%BD%E5%85%A5%E4%B8%AD%E5%9B%BD%E7%BB%84%E5%9B%BE163901. Archived on the wayback machine.

The tail and parachute of a second FAE bomb that landed on Chinese territory near Myanmar in March 2015.[99] (Kokang123.com)

On 14 January 2017 clashes broke out between the Myanmar military and Kachin Independence Army (KIA) troops in areas surrounding Loi Hkam School hill in southeastern Kachin state. Following ground assaults, two Myanmar military aircraft conducted airstrikes against the KIA 12th Battalion's Man Gau Base. According to sources present at the site, a munition exploded about 100 meters above ground causing damage to an office building and releasing gas that made KIA troops nauseous and dizzy, with some fainting.[100] The photos below show remnants of the bomb, recovered by KIA soldiers on 15 January 2017.

SAC-M has also received photographic evidence of an FAE aerial bomb dropped by the Myanmar Air Force in January 2017,[101] reportedly also against the KIA. While SAC-M has not been able to obtain

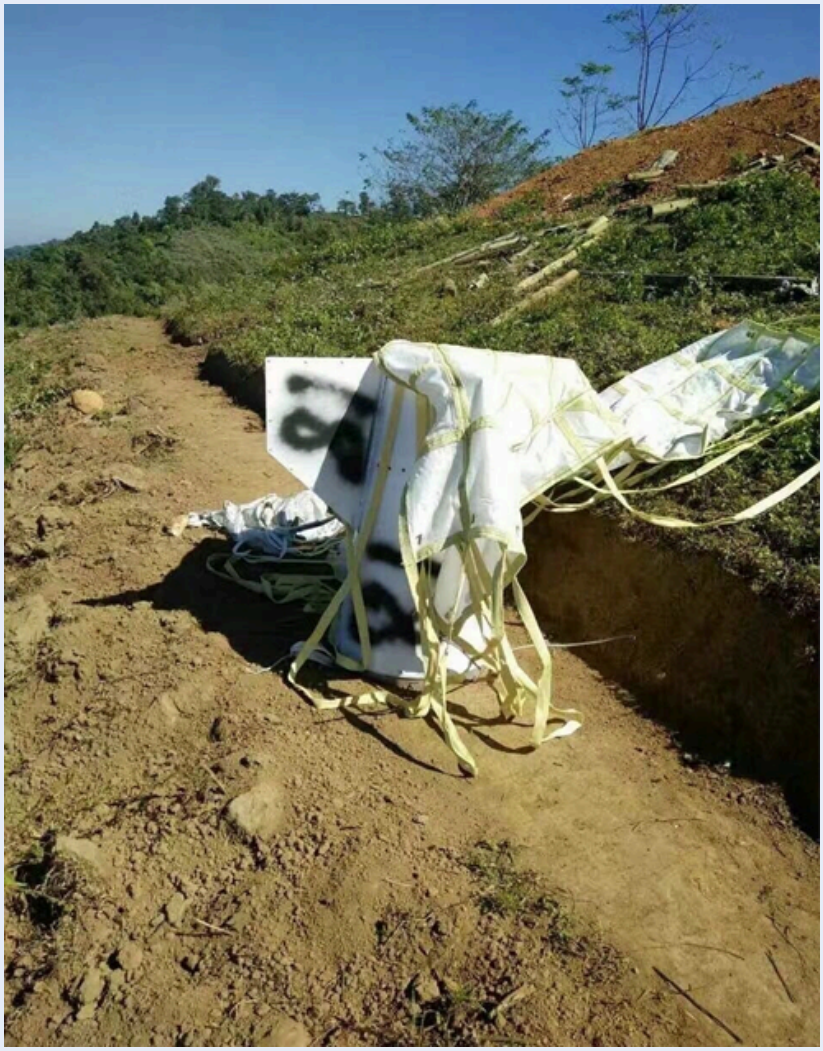
[99] Sina Military News 23 March 2015, available at http://mil.news.sina.com.cn/2015-03-23/1039825334.html. Archived: https://web.archive.org/web/2/http://mil.news.sina.com.cn/2015-03-23/1039825334.html.

[100] Nausea, vomiting, dizziness and malaise are common symptoms of exposure to ethylene oxide, a common explosive used in thermobaric and FAE munitions. See, for example, National Institute of Health *Acute Exposure Guideline Levels for Selected Airborne Chemicals* Volume 9 2010, available at https://www.ncbi.nlm.nih.gov/books/NBK208167/. Accessed 27 September 2024.

[101] The Irrawaddy *How China, Russia, keep the Myanmar junta's deadly aerial campaign aloft* 12 June 2023, available at https://

any additional information about this specific incident, it is possible that the bomb was used during the January 2017 attacks on the KIA outpost.

Independent Myanmar media outlet The Irrawaddy also reported in 2023 on the use of FAE bombs by the junta in 2017. Referring to the Myanmar military's bombings of villages with Chinese-made A-5 and upgraded K-8 aircraft, the article noted that the A-5 used by the junta could be equipped with China-made 250 kg 'thermobaric bombs'.[102] The article also included several photos, reportedly taken at the Tada-U airbase in 2017, showing FAE bombs being transported and attached to a Chinese A-5 ground attack aircraft used by the Myanmar Air Force.



Remnants of an FAE aerial bomb dropped by a Myanmar military fighter jet on the KIA's 12th Battalion Headquarters at Man Gau in Mansi township, January 2017.[103](Kachinland News)

www.irrawaddy.com/news/burma/how-china-russia-keep-myanmar-juntas-deadly-aerial-campaign-aloft.html.

[102] Note that this most likely refers to FAE bombs, not thermobaric, in the Myanmar context.

[103] Tsa Doi La and Nmang Ga *Burmese Fighter Jets Pounded KIA's 12th Battalion Headquarters with Cluster Bombs* Kachinland News 16 January 2017, available at https://www.burmalink.org/burmese-fighter-jets-pounded-kias-12th-battalion-headquarters-cluster-bombs/. Accessed 27 September 2024. Archived: https://web.archive.org/web/20230427140303/https://www.burmalink.org/burmese-fighter-jets-pounded-kias-12th-battalion-headquarters-cluster-bombs/.

On 6 February 2020 fighting between the Arakan Army (AA) and the military in Chin state intensified, peaking in the second week of March when the AA captured 36 soldiers, leading to retaliatory airstrikes and bombardments by the military. In March 2020 the AA recovered remnants of air-delivered bombs in the area close to the Mee Chaung strategic outpost in Paletwa township. Munitions experts have positively identified these remnants as being from FAE aerial bombs. Members of the AA have confirmed to SAC-M that between 2019 and 2021 the military made repeated use of these types of munitions in attacks against AA outposts.

An AA troop stands with remnants of FAE aerial bombs recovered in the vicinity of Mee Chaung strategic outpost, Paletwa township, Chin state, in March 2020.[104] (arakanarmy.net)

[104] Arakan Army Statement 18 March 2020, available at https://www.arakanarmy.net/post/%E1%80%90%E1%80%95-%E1%80%99-%E1%81%87%E1%81%87-%E1%80%9C%E1%80%80-%E1%80%A1-%E1%80%80-%E1%80%81-%E1%80%81%E1%80%99%E1%80%9B-%E1%81%87-%E1%80%91-%E1%80%99-%E1%80%9E-%E1%80%99-%E1%80%86%E1%80%8A-%E1%80%9B%E1%80%99-%E1%80%9E-%E1%80%85%E1%80%85-%E1%80%9E-%E1%82%94%E1%80%95%E1%80%94-%E1%80%9C%E1%80%80-%E1%80%94%E1%80%80-%E1%80%81-%E1%80%9A%E1%80%99-%E1%80%84-%E1%80%85%E1%80%85-%E1%80%A1%E1%80%9E-%E1%80%A1-%E1%80%86-%E1%80%84-%E1%80%95%E1%80%85%E1%81%A5%E1%80%8A-%E1%80%99. Archived to the Wayback Machine.

The military junta bombed a gathering in Pazigyi, Kantbalu township, Sagaing on 11 April 2023. Human Rights Watch analysis on 9 May 2023 concluded that the weapon used had been an 'enhanced blast type munition' or a 'thermobaric weapon'.[105] This conclusion was based on a review of 59 photos of victims' bodies and a video of the site in the immediate aftermath of the attack. The scale of the blast, the thermal damage to the building, the profound nature of the burns and the evident soft-tissue and crushing injuries suffered by the victims were considered distinctive enough to confirm the use of this type of munition. In military-controlled media, the junta claimed responsibility for the airstrike. Military spokesperson Zaw Min Tun confirmed that the attack had targeted people's defence force (PDF) members and that the casualties were a result of the strikes hitting PDF storage units for explosives and landmines which had subsequently exploded.[106] At least 155 people were killed in the attack, including dozens of children — some as young as 10 months old. In a recent interview with Al Jazeera, Zaw Min Tun claimed that the children were "part of groups working with terrorists" and described their killing as "collateral damage".[107]

Allegations that the military had used thermobaric weapons surfaced again a few months later, when the Myanmar Air Force bombed the Mung Lai Hkyet camp for internally displaced persons on 11 October 2023, killing 29 civilians. Military spokesperson Zaw Min Tun denied responsibility for the attack and instead accused the KIA of having stored a stockpile of ammonium nitrate and other explosive devices on site, causing the explosion.[108]

The military reportedly used 'thermobaric bombs' against KIA forces during a KIA attack on the 21st Military Operation Command in Bhamo township, Kachin state, according to an anonymous KIA source.[109] While no date for the incident was given, the military began escalating its aerial bombing of KIA forces in the area in late January 2025 as the KIA attack on the military command centre intensified.[110]

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[105] Human Rights Watch *Myanmar: Enhanced Blast Strike Likely War Crime* 9 May 2023, available at https://www.hrw.org/news/2023/05/09/myanmar-enhanced-blast-strike-likely-war-crime. Accessed 26 September 2024.

[106] ABC News *Myanmar military says it carried out deadly attack to target rebel forces* 12 April 2023, available at https://www.abc.net.au/news/2023-04-12/myanmar-military-justifies-deadly-attack-on-insurgent-ceremony/102215670. Last accessed 26 September 2024.

[107] Al Jazeera English. (2025, 14 April). *Myanmar military government defends rule minutes before deadly quake hits*. YouTube. Available at https://youtu.be/ejqdNTY1Xf8?si=Mx1w_jZfEk6_gTIy&t=769. Accessed 12 June 2025.

[108] Kachin News Group *Survivors recount horrific night after devastating bombing at Mung Lai Hkyet* 17 October 2023, available at https://kachinnews.com/2023/10/17/survivors-recount-horrific-night-after-devastating-bombing-at-mung-lai-hkyet/. Accessed 26 September 2023.

[109] The Irrawaddy *Myanmar Junta Using Devastating Thermobaric Bombs Indiscriminately: EAOs, Experts* 26 February 2025, available at https://www.irrawaddy.com/news/burma/myanmar-junta-using-devastating-thermobaric-bombs-indiscriminately-eaos-experts.html. Accessed 27 February 2025

[110] The Irrawaddy *Myanmar Junta Using Devastating Thermobaric Bombs Indiscriminately: EAOs, Experts* 26 February 2025, available at https://www.irrawaddy.com/news/burma/myanmar-junta-using-devastating-thermobaric-bombs-indiscriminately-eaos-experts.html. Accessed 27 February 2025.

Appendix C

China South Industries Group Corporation

China South Industries Group Corporation (China South) is a Chinese state-owned enterprise that operates in both the civil sector and the military sector.[111] Founded in 1999, China South is considered a strategic enterprise for the Chinese military and defence industry. According to the China State-owned Assets Supervision and Administration Commission of the State Council, a special commission under the State Council,

> China South Industries Group Corporation is a state-owned key enterprise directly managed by the central government, a core force of the national defense science and technology industry, a strategic enterprise for national defense and economic construction, and one of the most dynamic military-civilian combinations having a large military industrial group in China.
>
> As the backbone of the national defense technology industry, it has formed end-defense, light weapons, mobile assault, advanced ammunition, information optoelectronics, anti-terrorism devices and other equipment systems.
>
> The equipment is widely used by all armed forces in China, including land, sea, air, rockets, public security, and armed police. It plays an important fundamental and strategic role in China's national defense and security. The group's automobile products form a product lineage consisting of cars, micro-cars, buses, trucks and special-purpose vehicles. It has 10 production bases and 31 complete vehicle and engine factories in the country, with an annual production capacity of more than 3 million units.
>
> The group company actively implemented the 'bringing in' and 'going out' strategy, and established strategic partnerships with multinational companies such as Ford, Mazda and Peugeot Citroen. More than 30 R&D, production bases and marketing networks have been established around the world, and more than 60 well-known joint ventures have been cultivated. The products are exported to more than 170 countries and regions.[112]

In addition to cars, micro-cars, buses, trucks and motorcycles, China South develops, manufactures and markets a wide range of conventional arms and military goods, including small arms and light weapons, military vehicles, munitions (including aerial bombs), fuzes, 'command and control equipment', night vision equipment and simulator trainers.

Several of China South's subsidiaries that are not publicly involved in arms development research,

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[111] 中国南方工业集团公司, USCC 91110000710926043F.

[112] China State-owned Asset Supervision and Administration Commission of the State Council *China South Industries Group Corporation* updated 16 May 2019, available at http://en.sasac.gov.cn/2019/05/16/c_1551.htm. Accessed 27 September 2024. Archived: https://web.archive.org/web/20240529170921/http://en.sasac.gov.cn/2019/05/16/c_1551.htm.

production and marketing are also known to take on military contracts. Notably, arms experts interviewed by SAC-M concur that there seems to be a pattern of automobile manufacturing firms associated with China South that are increasingly taking on military contracts.

In practice any engagement between China South and foreign companies and universities entails significant ties to the civil-military fusion apparatus, including in the form of supply chain dependencies, technology sharing, and research and development cooperation that could strengthen China South's military production capabilities.

A screenshot of China South's webpage showcasing both military and civilian vehicles as its principal products.[113]

[113] Archived version of China South's webpage, available at https://web.archive.org/web/20231228134740/https://www.csgc.com.cn/.

China South is considered an entity associated with the Chinese military-industrial complex and is subject to restrictive measures by the US.[114] In practice, these measures prohibit any US person from purchasing or selling any publicly traded securities of China South and its subsidiary Costar Group.

Hunan Vanguard's aerial bomb production site in Changsha, China, where DI 21 engineers undertook munitions production training in 2015 and 2019. (Sohu, 2020)

[114] China South and its subsidiary Costar Group are currently listed on the Non-SDN Chinese Military-Industrial Complex Companies List (passed under Executive Order 13959, as amended by E.O. 14032, 16 December 2021). The List targets entities associated with the Chinese military-industrial complex and identifies companies that are contributing to the modernisation of the military capabilities of the People's Republic of China. US individuals and organizations are prohibited from engaging in transactions involving publicly traded securities of the listed entities and derivatives of those securities. The complete list available at https://www.treasury.gov/ofac/downloads/ccmc/nscmiclist.pdf, accessed 27 September 2024. The US Treasury's Office of Foreign Assets Control uses the 50 Percent Rule to extend sanctions to entities owned 50% or more by one or more sanctioned persons or entities. This means that, if a sanctioned person or entity owns 50% or more of another company, directly or indirectly, that company is automatically considered blocked. This applies even if the subsidiary is not specifically named on any OFAC list, including the Specially Designated Nationals List. The ownership threshold is aggregate, meaning that, if two or more sanctioned persons or entities collectively own 50% or more, the Rule applies. The Rule applies to entities on the Specially Designated Nationals List but not to entities on the Non-Specially Designated Nationals Chinese Military-Industrial Complex Companies List. If a company on the Non-Specially Designated Nationals Chinese Military-Industrial Complex Companies List owns a subsidiary, that subsidiary is not sanctioned unless it is separately listed. Neither of the two China South subsidiaries that have been involved in DI 21 production, Hunan Vanguard and Chongqing Changan, are separately listed and therefore they are not covered by US sanctions. Source: https://ofac.treasury.gov/faqs/.

Two China South subsidiaries have played significant roles in the development of and weapons production at DI 21.

Chongqing Changan (Chongqing Changan Industry Group Company Limited) is a fully owned China South subsidiary. It describes itself as a 'scientific research, trial production and production base for modern conventional key weapons'. The company operates a 'modern production base covering an area of 3,000 acres, with more than 8,000 employees'.[115] It is considered to be a close business associate with the Myanmar OCDI and to have been heavily involved in the development and operation of DI 21.

Hunan Vanguard (the Hunan Vanguard Group Co. Ltd.) is another China South subsidiary.[116] The company is described as a national military research and production enterprise and as a principal aviation munition research institute of China South.[117] Headquartered in Xiaoping, Henxi county, Hunan province,[118] Hunan Vanguard's sales offices are located in Changsha, where the company also operates research and development institutes.[119] The company operates a military engineering technology centre in Huaihua.[120] It is considered to be a close business associate with the Myanmar OCDI and to have been involved in the development and operation of DI 21.

[115] Corporate profile of Chongqing Changan, as presented by the company itself, available at https://www.linkedin.com/company/%E9%87%8D%E5%BA%86%E9%95%BF%E5%AE%89%E5%B7%A5%E4%B8%9A%E9%9B%86%E5%9B%A2%E6%9C%89%E9%99%90%E8%B4%A3%E4%BB%BB%E5%85%AC%E5%8F%B8/about/. On file with SAC-M.

[116] 湖南云箭集团有限公司, USCC 91431223707465979R.

[117] Chongqing University *Hunan Vanguard Group Co. Ltd profile* Student Career and Development Guidance Center 2022, available at http://www.job.cqu.edu.cn/company/view/id/527567. Accessed 12 October 2024.

[118] QCC KYC & International Due Diligence *Corporate profile for Hunan Vanguard Group Co Ltd*, available at https://www.qcc.com/firm/eaa035f319de0a8e2a826883e8fc8883.html. Accessed 10 October 2024.

[119] Heng Tian Finance *Hunan welcomes new opportunities, the central government's new batch of 7 major enterprise technology centers* 13 September 2024, available at https://baijiahao.baidu.com/s?id=1810050094419344127&wfr=spider&for=pc.

[120] See Jianxiang J *High Power High Polymer Bonded Explosives and Bipyramid Metal Liners Grain Pressing Technology* Ordnance Industry Automation 2012-01. DOI: 10.3969/j.issn.1006-1576.2012.01.005. Paper prepared for Engineering Technology Centre of Hunan Vanguard Group Co. Ltd, Huaihua. See also CN Verify *Engineering And Technology Research And Experimental Development* (Chinese companies list) undated, available at https://www.cnverify.com/companies/Engineering-And-Technology-Research-And-Experimental-Development/Hunan/Huaihua. Accessed 11 October 2024.

SAC-M is an independent group of international human rights experts working to support the peoples of Myanmar in their fight for peace, genuine democracy, justice and accountability.

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