

IMA Position paper - Magnesium and defence industrial resilience

[Based on government studies]

The paper is based on selected government studies that underline the geopolitical and strategic importance of magnesium for the defence sector. Public European Commission and U.S. Department of Defence studies demonstrate that magnesium is relevant across a broad range of defence applications, including military aeronautics, naval and land systems, drones, missiles, electronics, aerospace alloys, large structural castings and aircraft countermeasures. European Commission assessments identify magnesium as a defence-relevant raw material with high supply risk and full EU import dependency. Despite this evidence, magnesium is not included in NATO's current list of 12 defence-critical raw materials and is not prioritised on the current UK critical-minerals list. This creates a policy gap between documented industrial dependence and formal defence-critical-material recognition.

European Commission studies explicitly identify magnesium as:

- a raw material used across aeronautics, naval, land, space, electronics and missile applications.
- one of the materials for which the EU defence industry is fully import dependent.
- a material with relatively high supply risk.
- an input into military aircraft, drones, high-performance aluminium alloys and defence manufacturing.

The U.S. Department of Defense identifies magnesium in:

- large, complex aluminium and magnesium castings for military aircraft and rotorcraft.
- infrared countermeasure flares.
- defence-industrial capacity and supplier-risk assessments.

NATO's present list of 12 defence-critical raw materials does not include magnesium, although its wider defence-production policy addresses critical-material acquisition, stockpiling, transport and recycling. The current UK technical assessment includes magnesium among the materials evaluated for industrial growth, while the UK strategy directly links critical-mineral resilience to defence and national security.

Magnesium's broad use across critical defence applications, combined with its high supply risk and full EU import dependency, provides a strong case for its inclusion in the next revision of NATO's defence-critical raw materials list.

1) European Commission - Raw Materials in the European Defence Industry

Organisation: European Commission Joint Research Centre

The study¹⁾ identifies magnesium among 16 critical raw materials used in defence applications. It concludes that the aeronautics and electronics defence sectors are particularly vulnerable to supply constraints. It also states that the EU was fully dependent on imports for 19 materials used by the European defence industry, including magnesium. European defence production must be able to rely on an uninterrupted and secure supply chain for raw materials and processed materials. The study distinguishes between raw magnesium and the downstream forms actually purchased by defence manufacturers. It notes that defence companies usually procure alloys, semi-finished products and transformed materials, rather than elemental raw materials alone.

>> A disruption in primary magnesium supply can propagate into shortages of aluminium-magnesium alloys, magnesium alloys, castings and other semi-finished materials used by defence suppliers.

Critical Raw Materials for Strategic Technologies and Sectors in the EU

Organisation: European Commission Joint Research Centre

This report²⁾ provides the clearest cross-sector mapping of magnesium to European defence applications. It lists magnesium among the raw materials required by the EU defence industry and states that the EU is fully dependent on imports for magnesium and 12 other defence-relevant raw materials. The report assigns magnesium a supply-risk score of 3.91, placing it immediately below yttrium and above niobium and germanium in its defence-material risk table. Magnesium is marked as relevant to all six defence categories assessed:

Defence subsector Magnesium identified

Aeronautics	Yes
Naval	Yes
Land systems	Yes
Space	Yes
Electronics	Yes
Missiles	Yes

This is an unusually strong finding because few other materials are shown across every defence subsector. The study also identifies magnesium in the material composition of the Rafale combat aircraft, including the wings and fuselage material systems.

Military Drones and Unmanned Aerial Vehicles

The same study identifies magnesium as particularly relevant to drone production.

It reports that:

- 48 raw materials are relevant to drones.
- the EU is fully dependent on external supply for 40 of them.
- magnesium, rare earths, bismuth and tungsten are singled out as particularly important materials whose dominant supplier is China.
- magnesium metal is used in high-performance aluminium-magnesium alloys.
- magnesium alloys and aluminium-magnesium alloys are among the 14 processed-material groups used in drones.

This provides a direct policy link between primary magnesium supply and:

- military UAV airframes.
- lightweight structures.
- high-performance aluminium alloys.
- drone components manufactured through conventional or additive processes.

The report notes that Europe has useful downstream alloy capabilities, but these capabilities still depend on the availability of upstream raw materials.

Additive Manufacturing for Defense and Aerospace

The JRC foresight study describes additive manufacturing as a technology that will significantly reshape defence and aerospace supply chains.

Magnesium appears in:

- aluminium-magnesium powder families.
- high-performance lightweight alloys.
- the raw-material supply-risk assessment for additive manufacturing.

The study states that supply risks are particularly high for titanium, cobalt, magnesium, vanadium, tungsten and niobium in additive-manufacturing supply chains. This supports the argument that magnesium security is not limited to conventional castings. It also concerns future defence-manufacturing technologies, distributed production and replacement-part manufacturing.

“Aluminium Alloys” – Content of Magnesium in %:

“2024”	Aeronautic structures	1,5%
“5083”	Naval structures	4,4%
“5086”	Naval structures	4,0%
“5050”	Naval structures	5-6%
“6061”	Naval structures	1,0%
“6082”	Naval structures	1,2%
“7010”	Aeronautic structures	2,3%
“7040”	Aeronautic structures	2,1%

2) European Parliament: Defense Vulnerability from Raw Material Shortages

The European Parliament’s 2023 briefing on securing Europe’s critical-raw material (CRM) supply states that CRM shortages could create a critical military vulnerability for the EU.

- the JRC identifies magnesium as a material used by the defence industry.
- the EU is heavily or completely dependent on imports for magnesium.
- shortages of critical materials therefore create industrial and military vulnerability.

3. NATO’s List Does Not Currently Include Magnesium!

NATO published a list of 12 defence-critical raw materials in December 2024:

- aluminium
- beryllium
- cobalt
- gallium
- germanium
- graphite
- lithium
- manganese
- platinum
- rare-earth elements
- titanium
- tungsten

Magnesium is **not included**.

NATO's Wider Supply-Chain Policy Remains Relevant

NATO's updated Defence Production Action Plan commits Allies to identifying and mitigating constraints affecting the 12 listed materials, including potential onshoring and friend-shoring measures.

NATO has also established multinational cooperation covering:

- acquisition of defence-critical raw materials.
- stockpiling.
- transport.
- management.
- recycling of products and components.

>> The NATO framework recognises the strategic importance of defence-material resilience but omits magnesium despite European Commission evidence showing its use across aeronautics, naval, land, space, electronics and missile systems.

4) United Kingdom - Current UK Critical Minerals Strategy

The UK's *Vision 2035 Critical Minerals Strategy* states that critical minerals are essential to:

- the economy.
- national security.
- advanced manufacturing.
- defence.
- resilient industrial supply chains.

It specifically notes that the UK depends on geographically concentrated global supply chains for advanced manufacturing and defence.

Magnesium's status in the technical assessment

Magnesium is included in the technical annex as one of 82 candidate materials evaluated for the UK's forward-looking growth-minerals list. However, it is not included in the UK's principal 2025 Critical Minerals List. Its inclusion in the assessment therefore means that magnesium was considered as a candidate material, but it does not constitute an official UK critical-mineral designation.³⁾

UK Policy Interpretation

The UK evidence supports a broader argument that:

- defence is a recognised critical-mineral demand sector.
- magnesium has been evaluated within the UK material-assessment framework.
- nevertheless, it has not received formal priority status under the current list.

This is similar to the NATO situation: the general resilience framework is relevant, but magnesium's specific recognition is weak.

5) United States Department of Defense - Defense-Industrial-Base and Supply-Chain Assessment

Organisation: U.S. Department of Defence and interagency task force

This report⁴⁾ directly identifies vulnerabilities associated with magnesium-related defence manufacturing.

Large, Complex Magnesium Castings

The report states that only four suppliers had the capability to manufacture large, complex, single-pour aluminium and magnesium sand castings. It describes financial and supplier risks affecting components for a heavy-lift Marine Corps platform and warns that the loss of a qualified source could delay the programme and hinder the military's ability to provide heavy-lift support. This is a particularly useful reference because it connects magnesium-processing capacity directly to:

- military aircraft and rotorcraft components.
- qualified source availability.
- programme delays.
- surge capacity.
- operational readiness.

Magnesium in Aircraft Countermeasure Flares

The same report states that aircraft flares use hot magnesium pellets to distract heat-seeking missiles. It identifies declining domestic production capacity, supplier accidents, quality problems and delivery risks in the flare industry. The report therefore treats magnesium-flare manufacturing as a defence-industrial-base vulnerability rather than merely a technical application.

U.S. Military Research into Magnesium Alloys

Publicly available U.S. Army and national laboratory studies cover:

- magnesium armour plate.
- ballistic performance of AZ31B.
- advanced military-grade magnesium alloys.
- helicopter and aircraft transmission housings.
- lightweight vehicle and aerospace components.
- additive manufacturing.

These studies show that magnesium is being investigated not merely as an input for pyrotechnics, but as an engineering material that may improve:

- vehicle mobility.
- payload.
- air transportability.
- range.
- fuel consumption.
- armour mass efficiency.

Main Supply-Chain conclusions

>> Magnesium Demand Is Wider Than Direct Magnesium-Alloy Components

Defence dependence includes:

- primary magnesium metal.
- magnesium alloys.
- magnesium castings.
- aluminium-magnesium alloys.
- aerospace aluminium alloys containing magnesium.
- powders and feedstocks.
- pyrotechnic magnesium.
- qualified casting and transformation capacity.

>> Primary Metal Dependency Affects Downstream Autonomy

European firms may retain strong capabilities in alloy production, casting and component manufacturing, but those capabilities remain exposed when the primary magnesium input is imported from a highly concentrated source.

>> Defence Volumes May Be Small but Strategically Indispensable

Several sources note that military demand may be relatively low in tonnage. Small volume does not mean low criticality. Defence applications often require:

- certified suppliers.
- high purity.
- special alloy compositions.
- long qualification cycles.
- assured availability during crises.
- surge capacity.

>> Substitution Is Not immediate

Replacing magnesium or magnesium-containing alloys can require:

- structural redesign.
- requalification.
- new corrosion and fatigue testing.
- altered tooling and casting processes.
- changes in weight, payload or range.

Therefore, theoretical material substitution does not necessarily provide short-term defence resilience.

Policy statement

“The European Commission and U.S. Department of Defense studies demonstrate that magnesium is relevant across a broad range of defence applications, including military aeronautics, naval and land systems, drones, missiles, electronics, aerospace alloys, large structural castings and aircraft countermeasures. The European Commission assessments identify magnesium as a defence-relevant raw material with high supply risk and full EU import dependency. Despite this evidence, magnesium is not included in NATO’s current list of 12 defence-critical raw materials and is not prioritised on the current UK critical-minerals list. This creates a policy gap between documented industrial dependence and formal defence-critical-material recognition.”

Call for the Inclusion of Magnesium through an Amendment and/or in the Next Revision of NATO’s Defence-Critical Raw Materials List

“Given magnesium’s documented use across aeronautics, naval and land systems, space, electronics and missile applications, its high supply risk and the EU’s full import dependency,

magnesium should be strongly considered for inclusion in the next revision of NATO's defence-critical raw materials list. Such inclusion would allow magnesium to be considered more explicitly within Alliance measures addressing sourcing, stockpiling, joint purchasing, recycling and supply-chain resilience."

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Study references

¹⁾ European Commission JRC, 2016 — *Raw materials in the European defence industry*
<https://publications.jrc.ec.europa.eu/repository/handle/JRC98333>

²⁾ European Commission JRC, 2020 — *Critical Raw Materials for Strategic Technologies and Sectors in the EU*
<https://webgate.ec.europa.eu/circabc-ewpp/ui/group/cf89c883-2efd-452b-a037-de271c1a703c/library/fc974ab2-879e-4127-84c7-a6beec1c4ee9>

³⁾ UK Government, 2026 — *Vision 2035 Critical Minerals Strategy* and technical annex
<https://www.gov.uk/government/publications/uk-critical-minerals-strategy/vision-2035-critical-minerals-strategy>

⁴⁾ U.S. DoD, 2018 — *Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency in the United States*
<https://www.waru.edu/artifact/assessing-and-strengthening-manufacturing-and-defense-industrial-base-and-supply-chain>