

Ensuring Host Nation Support Through Airfield Damage Repair Capability: A Strategic Requirement for the Czech Republic

Eva ZEŽULOVÁ^{1*}, Jiří ŠTOLLER¹, Petr DVOŘÁK¹

¹Department of Engineer Technologies, Faculty of Military Technologies, University of Defence, Address: Kounicova 65, 662 10 Brno, Czech Republic

Correspondence: * eva.zezulova@unob.cz

Abstract

Airfield infrastructure represents a critical element of national defence and a key enabler of NATO Host Nation Support (HNS). Modern conflicts demonstrate that airfields are priority targets, and even limited damage to runways can significantly disrupt air operations. NATO standards, particularly STANAG 2929 and AATMP-03, therefore define Airfield Damage Repair (ADR) as a mandatory capability enabling rapid restoration of airfield functionality. This paper analyses ADR as an essential component of HNS and assesses the current state of ADR capability in the Czech Republic. Based on NATO doctrinal requirements and national research outcomes, the study highlights existing capability gaps and outlines key measures necessary to ensure compliance with alliance obligations and to enhance national and collective resilience.

KEY WORDS: *Host Nation Support, Airfield Damage Repair, NATO STANAG 2929, AATMP-03, RAOS, MOS/MAOS, rapid runway repair, military engineering, operational resilience.*

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1. Introduction

Airfields represent one of the most critical components of national defence infrastructure. In contemporary conflicts and crisis response operations, airbases enable rapid force projection, sustainment of logistical flows, intelligence, surveillance and reconnaissance activities, and strategic mobility of national and allied forces. Consequently, airfield infrastructure constitutes a priority target in modern warfare, as even limited damage to runways, taxiways, or aprons can rapidly degrade or completely halt air operations [1], [4].

Recent military conflicts have demonstrated that attacks on airfields no longer require large-scale, high-intensity strikes to achieve significant operational effects. Precision-guided munitions, ballistic and cruise missiles, and unmanned aerial systems enable adversaries to disrupt air operations through repeated, targeted attacks, often at relatively low cost [8]. In such an operational environment, the ability to rapidly repair and restore airfield operability becomes as decisive as preventive protection measures.

For NATO member states, the functionality and recoverability of airfields are not only a matter of national defence but also a key prerequisite for fulfilling Host Nation Support (HNS) obligations. NATO strategic and doctrinal documents explicitly emphasise that the reception, deployment, and sustainment of allied forces depend on the availability of resilient and repairable infrastructure, particularly airfields [1], [7]. The role of the host nation therefore extends beyond providing access to infrastructure and includes responsibility for ensuring its rapid recovery under combat conditions.

Within this context, Airfield Damage Repair (ADR) represents a critical enabling capability. NATO standardization documents, notably STANAG 2929 and AATMP-03, define ADR as a structured set of processes allowing damaged airfield operating surfaces and essential services to be restored within clearly defined operational timelines [5]. The effectiveness of HNS in crisis or wartime scenarios is thus directly linked to the existence of a credible national ADR capability.

This paper addresses ADR as a central component of Host Nation Support and analyses its strategic relevance for the Czech Republic. By combining NATO doctrinal requirements, national strategic commitments, and findings from recent applied research, the study highlights current capability gaps and frames ADR development as a priority issue for national defence planning.



Fig. 1 Satellite imagery illustrating airfield damage at the Belbek airbase (Crimea) following kinetic strikes in 2024, including destruction of parked aircraft and degradation of airfield operating surfaces. The figure demonstrates the vulnerability of airfield infrastructure to precision attacks and underlines the operational necessity of rapid Airfield Damage Repair (ADR) capability. Source: CNN [4]

Recent satellite images from the Belbek airbase in Crimea illustrate that even limited numbers of precision strikes can cause significant degradation of airfield operability, including runway damage and destruction of parked aircraft, thereby confirming the necessity of rapid Airfield Damage Repair capability, see Fig.1.

2. Host Nation Support and Strategic Obligations.

Host Nation Support encompasses civil and military assistance provided by a host nation to allied forces located on, operating within, or transiting through its territory. This assistance includes access to infrastructure, engineering support, logistics, and protection of critical assets. NATO doctrine identifies airfields as key nodes of HNS due to their decisive role in enabling the reception, staging, onward movement, and sustainment of forces [7].

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Strategic documents of the Czech Republic, including the *Defence Strategy of the Czech Republic (2023)*, emphasize the obligation to ensure conditions for allied operations on national territory. These commitments are reinforced by NATO standards requiring member states to assess, develop, and declare their national capabilities in specific functional areas. Within this framework, **Airfield Damage Repair (ADR)** emerges as a decisive capability with direct influence on the effectiveness and credibility of HNS. Strategic documents of the Czech Republic, including the *Defence Strategy of the Czech Republic 2023*, stress the obligation to ensure conditions for allied operations on national territory and to strengthen national resilience against military and non-military threats [7]. These commitments are further reinforced by bilateral and multilateral agreements, such as the Defence Cooperation Agreement (DCA) between the Czech Republic and the United States, which highlights increased requirements on host-nation infrastructure and support capabilities [9]. Within this framework, **Airfield Damage Repair** emerges as a decisive capability directly influencing the credibility and effectiveness of Host Nation Support.

3. Airfield Damage Repair as a NATO-Defined Capability.

The NATO standard STANAG 2929 and the associated publication AATMP-03 – Airfield Damage Repair Capability define ADR as a comprehensive set of activities aimed at establishing, sustaining, or restoring operational capability of airfield surfaces following damage [6]. ADR encompasses damage assessment, explosive ordnance reconnaissance and disposal (EOR/EOD), repair of airfield operating surfaces (RAOS), restoration of essential services and facilities (RESF), airfield certification, and continuous monitoring and maintenance.

AATMP-03 introduces a standardized planning methodology based on the systematic quantification of damage and repair effort. Damage is categorized as kinetic and non-kinetic and evaluated using parameters such as Existing and Future Kinetic Damage (EKD/FKD) and Existing and Future Non-Kinetic Damage (ENKD/FNKD). These parameters are aggregated into the Damage Rating Numeric Value (DRNV), which is subsequently converted into Work Units (WU) representing a normalized measure of repair effort [6]. This approach enables transparent assessment of required ADR capability levels and supports decision-making under time-critical post-attack conditions.

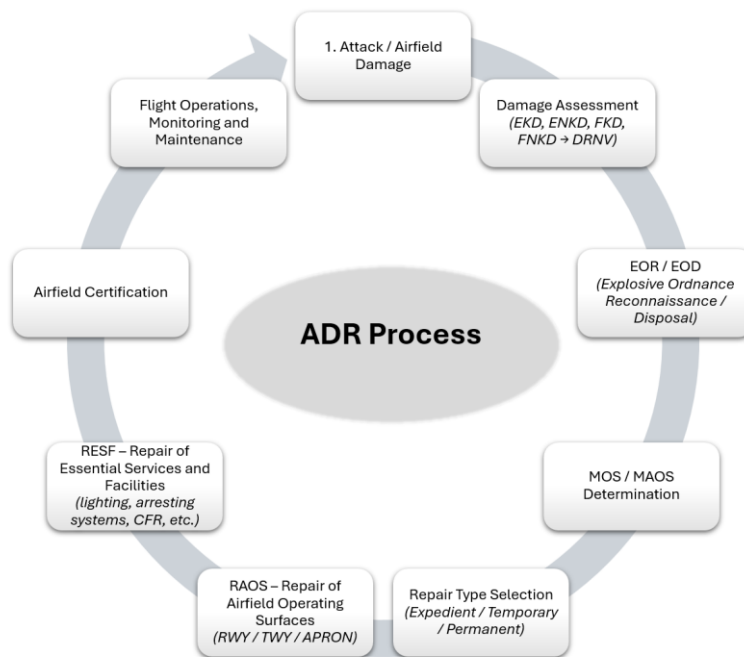


Fig. 2: The scheme of the Airfield Damage Repair (ADR) process according to AATMP-03.

Source: own, based on [6]

The scheme on the Fig. 2 illustrates the logical sequence from airfield damage occurrence through damage assessment, EOD/EOR activities, MOS/MAOS selection, repair type decision, RAOS/RESF execution, airfield certification, and subsequent monitoring and maintenance.

The Airfield Damage Repair (ADR) process represents a structured sequence of activities initiated after airfield damage caused by kinetic or non-kinetic effects. It begins with rapid damage assessment, including identification and classification of runway, taxiway and apron damage and evaluation of its operational impact, followed by EOR/EOD activities to detect and remove unexploded ordnance. Based on the assessed damage and mission requirements, a Minimum Operating Strip (MOS) and Minimum Airfield Operating Surface (MAOS) are defined, and an appropriate repair type (expedient, temporary or permanent) is selected. Subsequently, repairs of airfield operating surfaces (RAOS) and restoration of essential services and facilities (RESF) are executed in accordance with available time, resources and required aircraft operations. The process concludes with airfield certification by the responsible authority and continues with monitoring and maintenance to ensure sustained operational safety and functionality.

4. ADR Capability Levels and Operational Timelines

According to AATMP-03, ADR capability is structured into three principal levels: Small, Medium, and Large capability, each representing a specific combination of trained personnel, specialized equipment, materials, and logistical support [6]. The required capability level depends on the repair time, repair type, expected damage intensity, and mission profile

Repair types are categorized as Expedient, Temporary, Permanent, or Phased. Expedient repairs focus on restoring a Minimum Operating Strip (MOS) within hours and are designed to support a limited number of aircraft movements under austere conditions. Temporary repairs provide higher durability and allow sustained operations over longer periods, while permanent repairs correspond to full reconstruction under standard engineering norms. NATO doctrine explicitly notes that a capability sufficient for sustainment operations may be inadequate for post-attack recovery, which typically requires significantly higher ADR capability within much shorter timeframes [6].

The relationship between ADR capability, repair time, and Work Units is illustrated in Fig. 2, showing that achieving shorter repair times requires a disproportionately higher ADR capability, particularly in scenarios involving extensive kinetic damage.

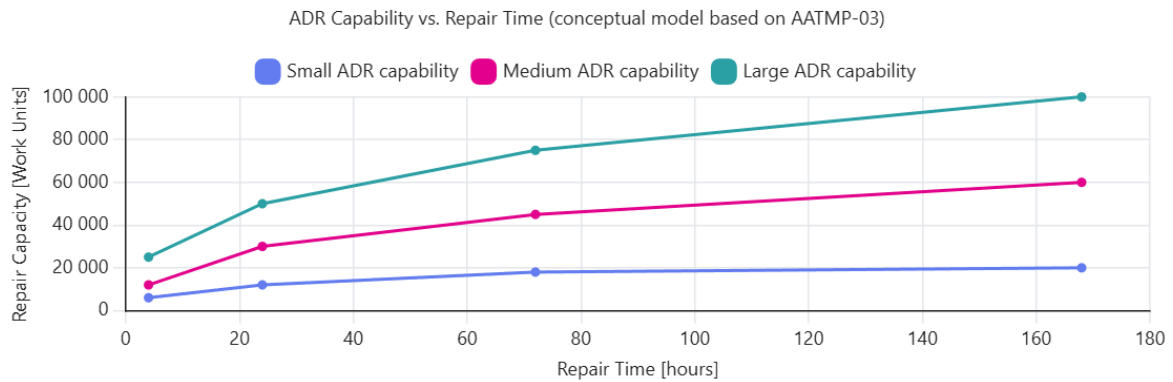


Fig. 3. Relationship between ADR capability and required repair time expressed in Work Units (WU).

Source: own, based on [5]

The Fig. 3 shows the conceptual diagram. The diagram illustrates the increasing ADR capability required to achieve shorter repair times and to address higher damage ratings (DRNV), distinguishing Small, Medium and Large ADR capabilities in accordance with AATMP-03. The Small / Medium / Large capability curves clearly show that shorter Repair Time equates to exponentially higher demands on equipment, personnel, supplies, and organization. Furthermore, the graph in Fig. 3 indicates that capabilities sufficient for sustainment may not be sufficient for post-attack recovery, and that for shorter Repair Time, the demands on capability are not linear but exponentially higher

5. Current State of ADR Capability in the Czech Republic

Despite clearly defined NATO requirements, the Armed Forces of the Czech Republic currently lack a fully established, trained, and certified ADR capability. Existing engineer units are not systematically organized, equipped, or trained to execute RAOS repairs in full accordance with AATMP-03 methodology, and national doctrinal documents address ADR only partially [8].

This capability gap has been confirmed by the MOVPD research project commissioned by the Ministry of Defence of the Czech Republic. The project analysed realistic airfield damage scenarios based on contemporary conflicts and identified technical, material, and personnel requirements for rapid runway repair [7]. Baseline scenarios involving multiple large and small craters combined with extensive spalling demonstrate that, without dedicated ADR units and pre-positioned repair systems, repair timelines would significantly exceed NATO operational expectations, particularly in post-attack recovery phases.

6. Operational and Strategic Implications

The absence of an effective ADR capability entails serious operational risks. Without the ability to rapidly restore airfield functionality, the Czech Republic would face substantial limitations in receiving allied reinforcements, supporting air operations, and sustaining joint missions. Such constraints would undermine the credibility of national defence commitments and reduce the overall resilience of the Alliance [1], [7].

From a strategic perspective, ADR capability contributes to deterrence by denial. Empirical evidence from recent conflicts shows that even limited and relatively low-cost attacks on airbases can temporarily neutralize airpower if repair capabilities are insufficient [2]. Conversely, the ability to rapidly repair airfield damage reduces the effectiveness of adversary attacks and complicates enemy operational planning.

7. Recommendations for Capability Development

To meet NATO obligations and ensure effective Host Nation Support, the Czech Republic should prioritize the systematic development of ADR capability. Key measures include the establishment of dedicated ADR units within engineer forces, procurement of standardized repair systems (e.g., FRP mats, modular concrete panels, rapid-setting materials), and integration of ADR procedures into national military doctrine [6], [9].

Equally important is the implementation of regular training and realistic exercises focusing on time-constrained repairs, EOD/EOR coordination, and certification processes in line with AATMP-03 and ACE Directive 80-15 [5]. These measures would enable the Czech Republic to declare a credible national ADR capability and significantly strengthen its contribution to collective defence and Host Nation Support.

8. Conclusions

Airfield Damage Repair is not a niche engineering activity, but a strategic military capability fundamentally linked to Host Nation Support and NATO collective defence. Alliance standards and doctrines explicitly identify the availability

and recoverability of airfield infrastructure as a prerequisite for the effective reception, deployment, and sustainment of allied forces on host-nation territory [1], [5], [7]. The ability to restore airfield operability within hours or days therefore directly determines whether Host Nation Support commitments can be fulfilled in a crisis or wartime scenario.

For the Czech Republic, the development of a credible ADR capability represents a core enabling function of HNS rather than a standalone technical task. Without rapid runway repair, EOD/EOR integration, and airfield certification capacity, the reception of allied airpower and strategic transport cannot be reliably guaranteed, regardless of formal agreements or political commitments [7], [9]. In this sense, ADR forms a critical interface between national defence responsibilities and alliance-level operational requirements.

Moreover, the systematic establishment of ADR capability significantly enhances Host Nation Support credibility by reducing vulnerability of air bases to kinetic attacks and limiting the adversary's ability to disrupt allied operations with relatively low-cost means [5]. From a broader perspective, ADR acts as a force multiplier within the HNS framework, strengthening deterrence, interoperability, and resilience of both national and allied forces. Closing the identified ADR capability gap is therefore essential not only for national defence, but also for the Czech Republic's role as a reliable and prepared host nation within NATO.

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