



V EDITION
2024-2025

European Defence Challenge 5th edition

“Towards a Safer Tomorrow: Multidisciplinary Approaches to Landmine Clearance and Security Enhancement”



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The European Defence Challenge was established under the ASSETS+ project (2020-2023)

This is the template for the 1 page proposal (500-600 words) that presents a solution (new usage or suggest improvements on a new technology).

If your proposal is selected for the second stage of the Challenge, you will be asked to expand the description to 10 pages (5000-6000 words) which should be a development of the previously submitted proposal.

IMPORTANT: Students are strongly encouraged to team up in pairs, finding a partner in a different university or country. Teams will get an additional point in the final score.

A fresh view is valued. Please, defend your proposal by including not only technological, but also socio-economic, political, ethical and/or environmental aspects.

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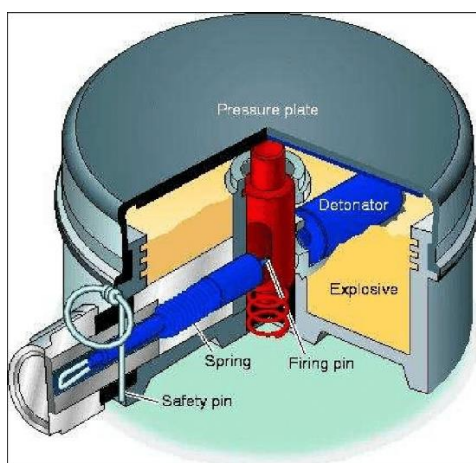
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Scenario specific demining

This report covers scenario-based solutions for demining specific anti-personnel mines used in Ukraine, such as pressure-activated mines (PMNs) and tripwire-activated (POM-2). Our solutions focus on military and humanitarian demining in mainly forest areas or other poorly accessible areas by either activating or neutralizing the mines. The solutions do not include the detection of mines, solely the demining and neutralization of the already located mines.

Scenario 1 – (PMN)

A PMN mine has been located in a poorly accessible area underground and needs to be cleared.



To clear the mine, the pressure detonator will be utilized in 3 different ways.

These three concepts have the same 2 main parts (frame and delivery). The 3 changing parameters are the trigger, which is used for the pressure plate.

The frame is made from steel/iron or other easily gathered materials/scrap. It is used to hold the trigger above the mine, so the trigger can activate the pressure plate.

The Delivery has to plant the frame on the mine (RC vehicles or other)

The Trigger in the mine with these 3 concepts:

1. Spring
 - Use a loaded spring to push on the pressure plate
2. Water pressure
 - Use high water pressure to shoot vertically on the pressure plate
3. Air
 - Use high-pressure air to shoot vertically on the pressure plate

The **First** concept should work with car springs or similar where the spring is compressed with a trigger device holding it in place and is mounted on the

frame. The device should then be triggered by a wire which can be operated safely from a distance.

The **Second and Third** pressure triggers would work similarly but with either water or air pressure, depending on what is the most cost-effective method. All the trigger methods will be tested in stage 2 of the project as well as the delivery method.

Scenario 2 – (POM-2)

A POM-2 mine has been located in a forest area and shall be neutralized.

The POM-2 is tripwire activated, the mine explodes with fragments when detonated, thus nearby people can be severely injured or killed.

Our solution for this scenario consists of utilizing and optimizing the already used grappling hook which some countries use for anti-vehicle mines and unexploded ordnance. The grappling hook will interfere with the tripwire and activate the POM-2 mine. Thus, the solution consists of a harpoon-like mechanism that utilizes the grappling hook from a safe distance.

Scenario 3 – Disabling

A mine has been located in an area where demolition is undesired and needs to be disabled.

This solution is a remote-controlled vehicle that is equipped with a torch to burn the detonator in the mine. Many explosives can't be heat activated and therefore fire can be used to neutralize the detonator in the mine.

Weakness to our solutions:

- No tests have been conducted; thus, all solutions are theoretical but could be tested in stage 2.
- Could be hard to reuse (can't be verified before being tested).
- Our solutions are best utilized in poorly accessible areas (forests, overgrown places, urban areas) since heavy vehicle deminers can clear open areas.

Further estimates

Our solutions are based on having a low-cost option that can be used by combat soldiers with limited to no training. Safety is our highest priority and the user shouldn't be exposed to any danger. The concepts so far need further development, this will be conducted in phase 2. All solutions are targeted to be less than 500-euro investment for the non-exposed equipment, and then less than 100-euro pr. Mine. The solutions have the potential to be reused if developed correctly.

References:

https://www.hrw.org/sites/default/files/media_2023/06/UkraineLM_Briefing_June2023.pdf

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<https://apps.dtic.mil/sti/tr/pdf/ADA426229.pdf>