



INTRODUCTION

COMPARATIVE ARTICLE

During the GRIMPDAY 2024 event, the ELEVATED SAFETY team had the opportunity to compare different rescue techniques on the same site.

24 teams were present at the event and were able to put their skills into practice and evaluate the effectiveness of different rope rescue methods.

The event created an environment conducive to exchange. Each team presented and demonstrated the techniques they usually use, while observing the approaches of other teams.

For us, the main objective of this comparison is to identify the advantages and disadvantages of each rescue technique, and to evaluate the speed, simplicity, versatility and other key factors associated with each method.

This type of comparison enables us to improve the safety and efficiency of rescue operations by giving teams the opportunity to hone their skills and adopt the best techniques available.

The ELEVATED SAFETY team is proud to have participated in this event, and to have contributed to the continuous improvement of rope rescue methods.

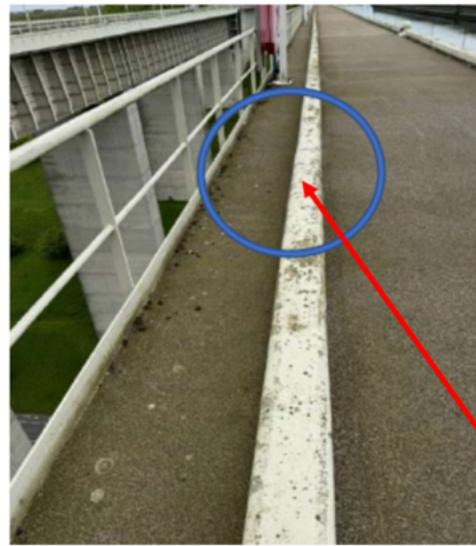
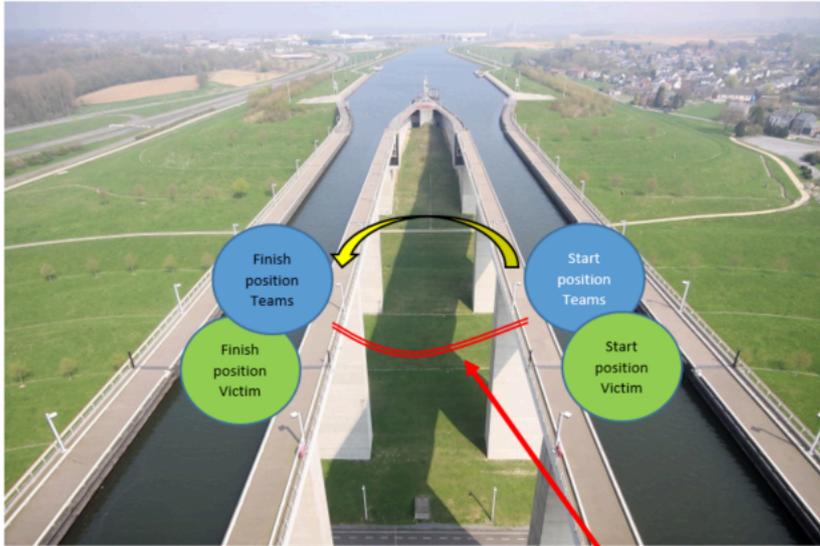


Selected work: “d’une rive à l’autre”, boat elevator, Strépy-Thieu, Belgium.

This event presented a unique and complex situation for the participating teams. The test configuration consisted of two canals 21 meters apart and 73 meters high.

The teams' mission:

- A victim is present at station **A**.
- The victim must be evacuated horizontally to station **B**.
- The whole team starts at station **A**.
- Access to the station is on foot along the marked corridor (not timed).
- The stopwatch starts when the team is at station **A**.
- The event is over when everyone (victim, team and equipment) is at station **B**.
- Anchor points are determined
- Two ropes are installed to enable team members to reach the other side. These ropes are secured and remain in place. **They may only be used for the passage of teams. Under no circumstances may these ropes be used for the rescue workshop.**
- The stretcher must pass over the barrier
- After the briefing, the team leader can choose to leave equipment in the Drop zone. Once out of this zone → **HE WILL NOT BE ABLE TO RETURN.**
- All used equipment must cross over to station **B**



Mandatory anchoring on both sides



Pre-installed ropes
 Only possibility for the team to go from one side to the other
 Ropes must be used as they are and the installation must not be modified

The article highlights the different approaches used by teams to resolve this complex situation. It examines the advantages and disadvantages of each technique, focusing on aspects such as speed of execution, stability, victim safety and ease of use.

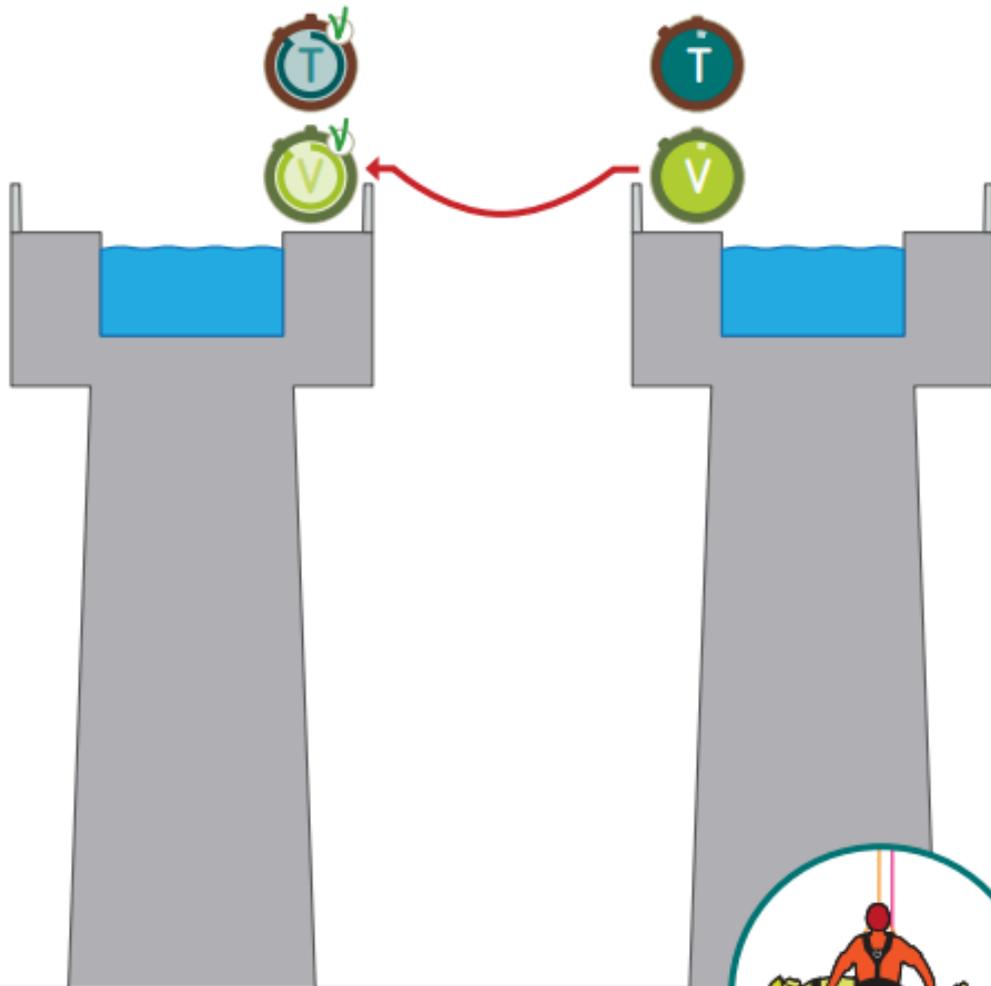
Each team is responsible for choosing the most suitable method for reaching the victim, securing him/her and moving him/her to the other channel.

- Around 50% of teams opted for rope pulley systems (pulley train on zip line).
- The remaining 50% used translation devices on two ropes (Cross Haul system).

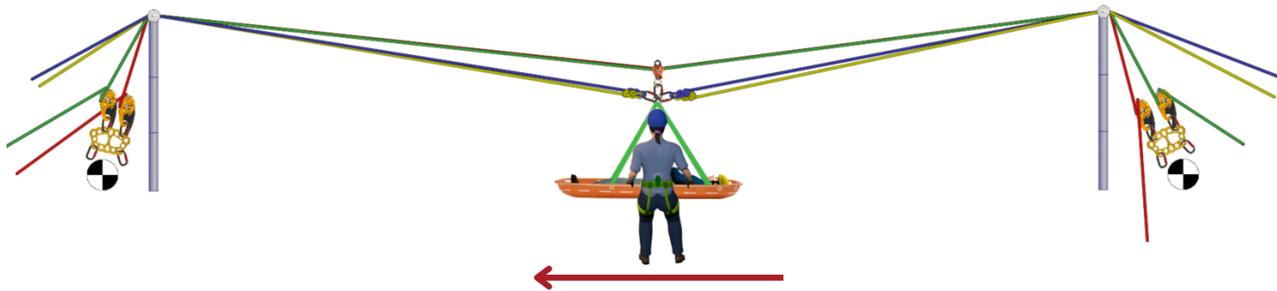
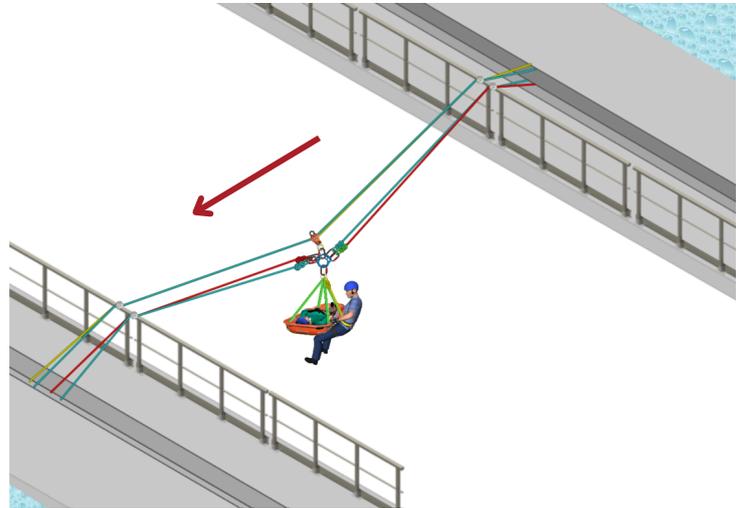
2024 D'UNE RIVE À L'AUTRE

Pre-installed ropes may only be used for the passage of teams. They must not be moved or modified. Under no circumstances may they be used for the rescue workshop.

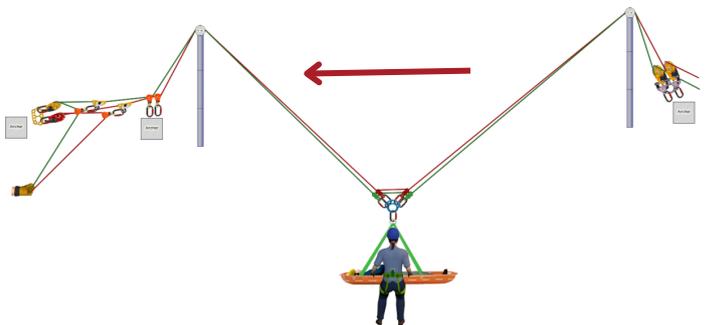
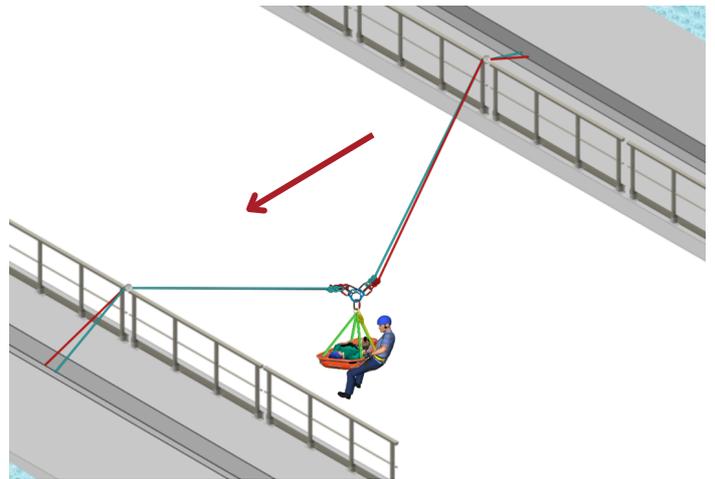
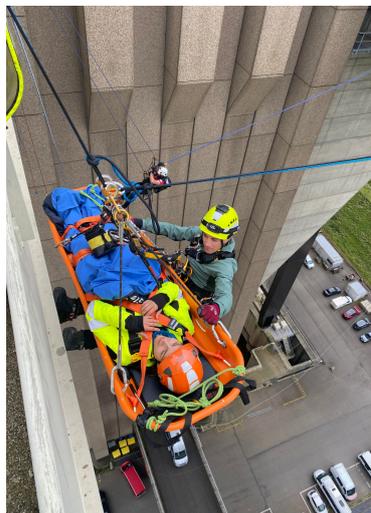
-  START POSITION TEAM
-  FINISH POSITION TEAM
-  START POSITION VICTIM
-  FINISH POSITION VICTIM



PULLEY TRAIN ON 50% TENSIONED ROPE

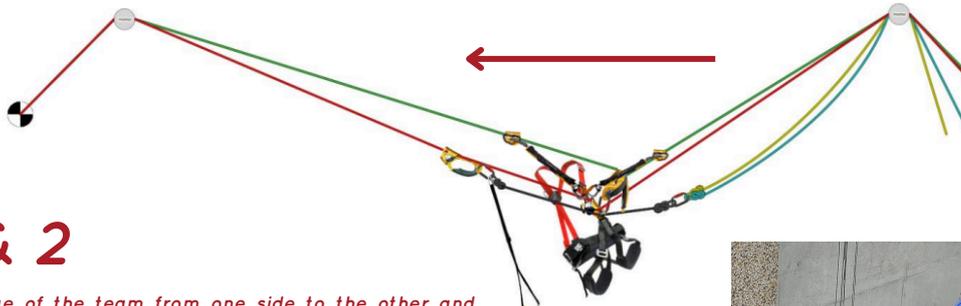


CROSS HAUL AT 50%



Summary comparison of rescue stages :

- 1. Moving personnel from one side to the other (re-Anchor):** This step involves moving team members from one side to the other using a re-Anchor method on the two pre-installed (non-modifiable) ropes. This may involve the use of ropes, pulleys or other equipment to ensure a safe and efficient transfer.
- 2. Passing ropes according to chosen technique:** Depending on the technique chosen, ropes can be passed from one side to the other using different methods. This may include the use of specific knots, pulley systems or other rope handling techniques.
- 3. Traction device optimization:** The aim of this step is to optimize the traction device used to move the stretcher from one bank to the other. This may include adjusting traction parameters, using additional pulleys or other adjustments to ensure smooth, controlled stretcher movement.
- 4. Moving the stretcher from one side to the other:** Once preparations are complete, the stretcher can be moved from one side to the other using the optimized traction device. Precise coordination is required to ensure the safety and stability of the stretcher during the passage.
- 5. Summary with positive and negative points :** At the end of the process, it is important to summarize the results obtained. This includes identifying positive aspects, such as the efficiency of the passage and the safety of those involved, as well as any negative aspects, such as difficulties encountered or potential improvements to be made to the process.



1 & 2

(Passage of the team from one side to the other and passage of the ropes)

For all teams, stages 1 and 2 were carried out simultaneously. Passing personnel from one side to the other involved moving team members using a re-Anchor method on the two pre-installed ropes. Rope passage for the rescue workshop depended on the technique chosen. Different techniques were used, either the classic re-anchor technique with two descenders and two fall arresters pulling the ropes of the rescue workshop, or a pulley managed from above with the future ropes of the rescue workshop, followed by the use of a jumar handle in the ascent phase with fall arresters.





PHASE 1 & 2 COMPARISON TABLE :

Tactical choices

(+)

(-)

Teams on classic Re-Anchor with two descenders and two fall arresters

Autonomous personnel during the crossing

High physical effort
Risk of descender blockage in the middle phase of the traverse
Permanent cross-control monitoring

Pulley train passage managed from above with future ropes from the rescue workshop and jumar handle ascent

Speed of execution
Optimization of human potential
Staff preservation
Physical effort is limited to the final phase of the crossing by hoisting the jumar handle.
Use of pulley blocks to optimize ascent

A staff blocked during the management of the top (twin tension) during the crossing of the personnel.

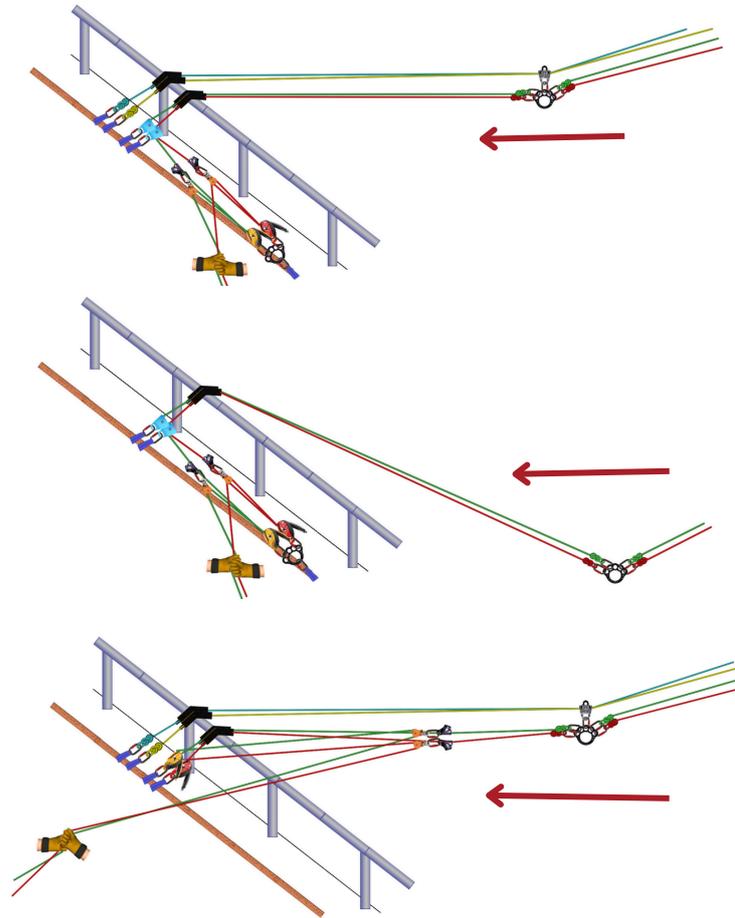
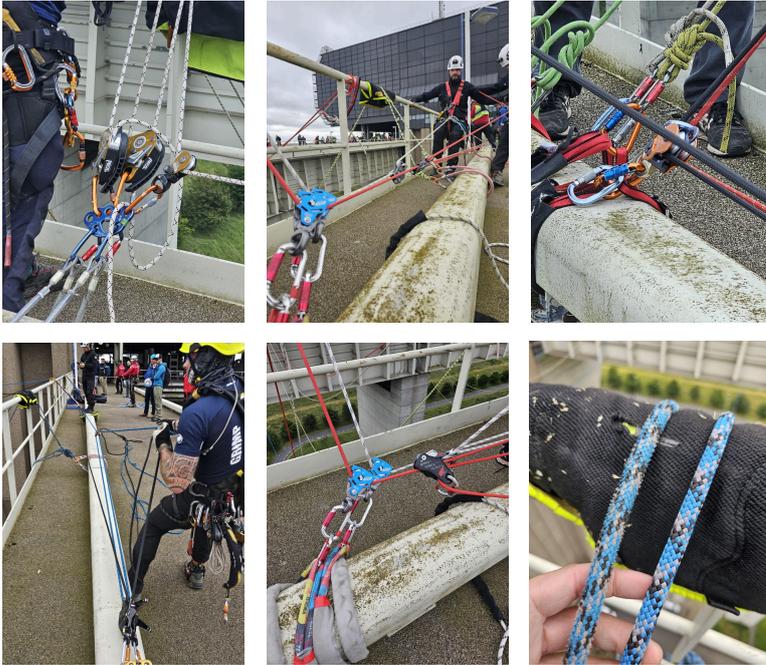
General comments

Re-Anchor's ropes were all in place before the crews arrived. All evenly adjusted, but overly taut. This forced the teams to make extra efforts, depending on their tactical choices.

3

(Choice and management of traction equipment)

Observation of this stage shows that optimizing the traction system is of paramount importance in the tactical choice, as it ensures fluidity and the maintenance of physical and human potential.



PHASE 3 COMPARATIVE TABLE :

Tactical choices

(+)

(-)

Live 3:1 traction

Quick and easy to assemble

High physical effort
Great effort on edge protection
Little mechanical advantage
Limited hoist return, difficult to achieve

3:1 or 5:1 pull with anchor return

Significant mechanical advantage
Preserved physical condition
Material and human optimization
Easy hoist return along the entire length of the line

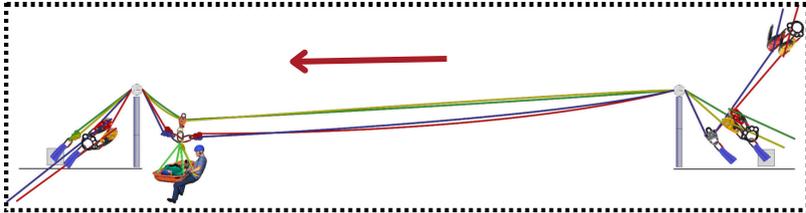
Big effort on the return pulley
Great effort on edge protectors
Time-consuming installation

General comments

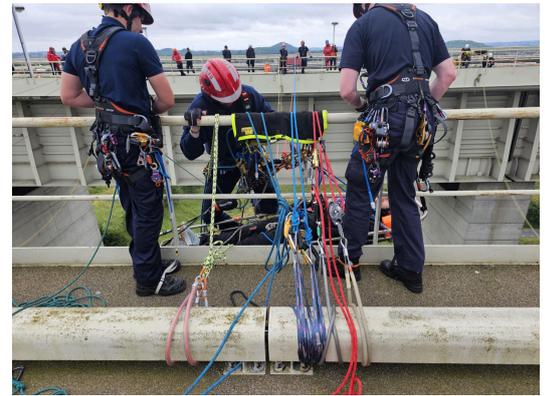
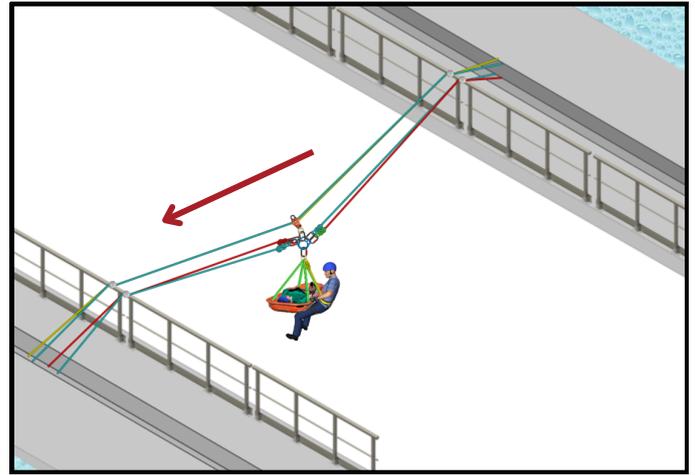
Each team was given a 6-metre-wide working line. Building a traction device on the proposed width optimized work quality and output.

4

(Passing the stretcher from one side to the other)



PULLEY TRAIN ON 50% TENSIONED ROPE

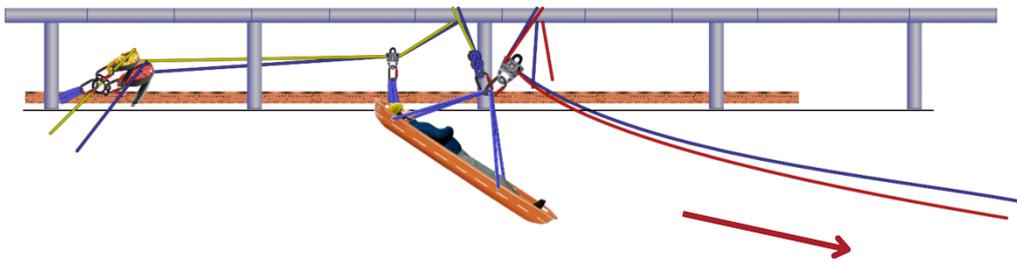


(+)

(-)

Smooth travel
Fast travel
Low effort on traction devices
Preservation of personnel

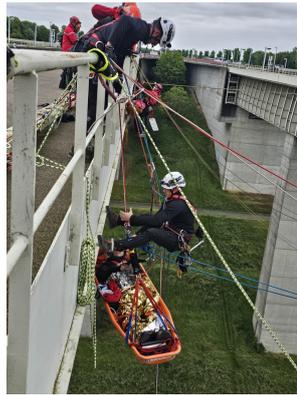
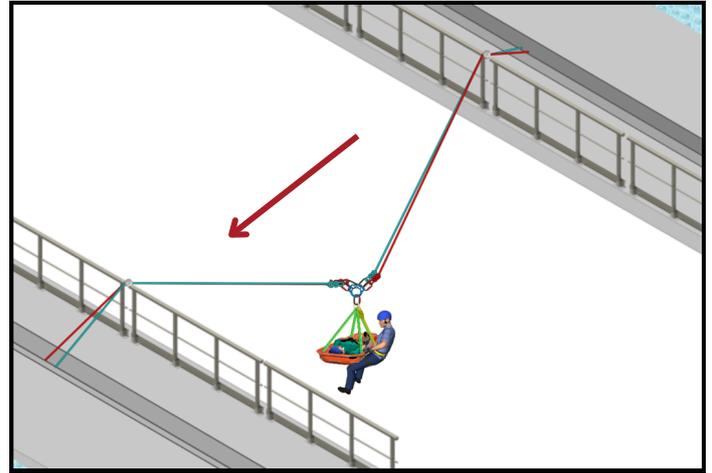
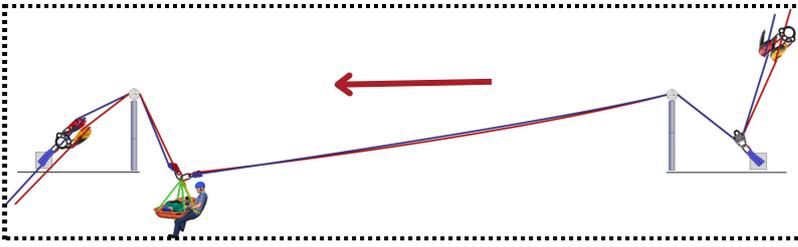
Difficulty getting the stretcher into and out of the vacuum with load-bearing ropes in the passageway
Increased material requirements
Longer set-up times
Less legible devices



Key figures

(Timing from test start to stretcher exit)

Team 1	1H11
Team 2	45 MIN
Team 3	45 MIN
Team 4	42 MIN
Team 5	1H00
AVERAGE	52 MIN

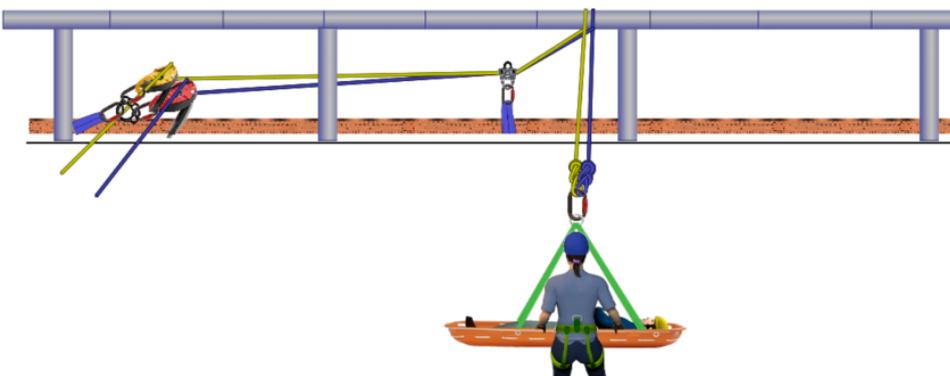


(+)

(-)

Smooth translation
 Quick set-up
 Simple set-up
 Easy unloading and stretcher discharge
 Less material used, more legible devices

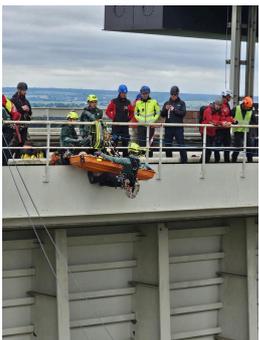
Increased pulling forces
 Personnel consumption during traction phases



Key figures

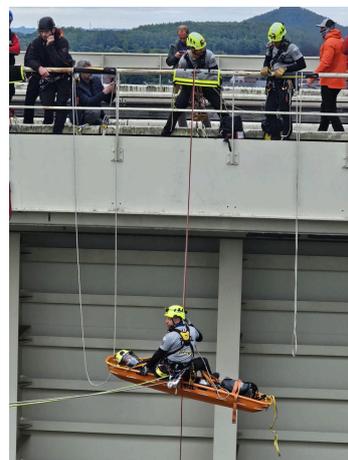
(Timing from test start to stretcher exit)

Team 6	59 MIN
Team 7	1H00
Team 8	1H00
Team 9	35 MIN
Team 10	1H38
AVERAGE	62 MIN



General summary of the two selected systems

Tactical choices	(+)	(-)	Average time
Pulley train on tight rope	<ul style="list-style-type: none"> Smooth travel Fast travel Low effort on traction devices Preservation of personnel 	<ul style="list-style-type: none"> Difficulty getting the stretcher into and out of vacuum with load-bearing ropes in the passageway Increased material requirements Longer set-up times Less legible devices 	52 MIN
Cross haul system	<ul style="list-style-type: none"> Smooth translation Quick set-up Simple set-up Easy unloading and stretcher discharge Less material used, more legible devices 	<ul style="list-style-type: none"> Increased pulling forces Personnel consumption during traction phases 	62 MIN
General comments	<p>The pulley train offers better personnel conservation and smoother travel, but presents challenges in terms of implementation and legibility. Cross haul, on the other hand, is simpler and quicker to set up, but requires more pulling effort and consumes more manpower.</p>		



CONCLUSION

A comparative summary of the steps involved in the rope rescue process reveals key aspects of the different techniques used.

- Personnel handover (re-Anchor): This step is crucial to ensure a safe transfer.. Positive points include personnel autonomy, while disadvantages highlight the significant physical effort involved and the risk of equipment jamming.
- Rope routing: Depending on the technique chosen, routing methods influence both safety and efficiency. Conventional techniques offer speed and optimization, but can also lead to difficulties, particularly when it comes to rope management.
- Optimizing the pulling device: This step is essential to ensure smooth movement. Advantages include preserved physical condition and improved efficiency, while disadvantages can include high physical effort and challenges in set-up.
- Passing the stretcher: Precise coordination is required to successfully complete this step. Fluidity and speed are major assets, but difficulties may arise when setting up the vacuum.
- Summary of results: Evaluation of the techniques reveals that the pulley train offers better staff preservation and fluidity, while the cross haul stands out for its simplicity and speed of set-up, but requires more pulling effort. In conclusion, each method has advantages and disadvantages which need to be carefully considered to optimize rescue operations, with the emphasis on efficiency, safety and preservation of human resources.

In conclusion, the GRIMPDAY 2024 event was a valuable opportunity for the ELEVATED SAFETY team and the 24 participating teams to compare different rope rescue techniques in a collaborative setting.

Exchanges of experience and hands-on practice helped to identify the strengths and weaknesses of each method, while highlighting the importance of optimizing traction devices.

The results of this comparison, intended to be shared with the rescue community, underline the need for ongoing training and adaptation to new technologies to ensure safe and effective interventions.

In this way, the event contributes not only to the improvement of team skills, but also to the evolution of rescue practices, enhancing the safety of future operations.

GRIMP DAY EVENT RESULT

FRIDAY

D'UNE RIVE A L'AUTRE

N°	Total	Team name
1	74.0	Bomberos Granada
2	54.5	Team GRIMP 38
3	77.0	Rope rescue Team 76 (Rouen)
4	86.8	Team SIS - Genève
4	88.1	Fire brigade Czech Republic
6	56.0	Red Team Westhoek
7	16.3	Dublin Fire brigade
8	78.8	HUNOR
9	80.2	RISC Bruxelles
10	82.9	Zéro G Squad-grimp
11	72.4	SV operaciones Chile
12	100.0	NR JAPAN

N°	Total	Team name
13	76.0	Feuerwehr düsseldorf - Höhenrettung
14	76.8	Novikontas Energy Rescue
15	88.6	GO ROPE RESCUE
16	55.5	Brampton Demons
17	74.2	London Fire Brigade
18	2.5	HKFSD High angle Rescue Team
19	8.8	SORT
20	27.5	Guardians
21	70.5	Corvus
22	95.1	Rope rescue România
23	81.5	SDIS 13
24	68.5	HKRU @ Grimpday ASIA