PROPOSAL OF AN ANCHOR DEVICE TO REDUCE THE RISK OF FALLS DURING ROCK EXTRACTIVE ACTIVITIES

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INTRODUCTION

An analysis of accidents resulting from falls from a height in extraction sectors has revealed a problem in regard to the lack of suitable technologies for specific situations. We propose an anchoring device that would represent a solution to the problem of falls, as many tasks in quarries are performed without suitable support points or on unstable fronts for short periods of time, with workers required to move around without the kind of protection that would reduce the risk of falls.

BACKGROUND

Although a solution in the form of individual or collective protection systems for work performed on quarry fronts that carry a risk of a fall from a height exists, the cost of assembling such systems is not practical when short-term tasks are performed, and hence, other solutions need to be found.

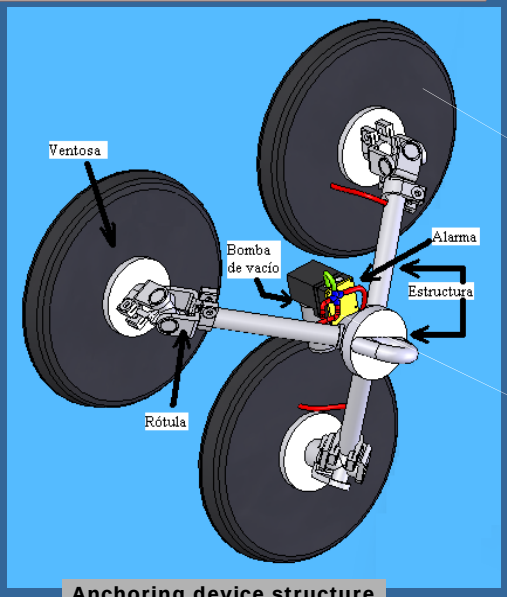
AIMS

Our aim was to develop an anchoring device whose main difference with respect to devices already in the market would be the use of suction as the means for anchoring.

APPLICABILITY OF THE ANCHORING DEVICE

Ease of installation and versatility. All that is required is to select a suitable anchoring point and manually charge the device. This simplicity is a major advantage as far as short-term or variable tasks are concerned (for example, in quarries).
Maintenance of manoeuverability. The suction system is light and compact.
No damage to the installation surface. Conventional anchoring systems require drilling or other operations in order to be able to use them. The suction system only requires a suitable work surface to which to attach the suction pads.

ANCHORING DEVICE STRUCTURE



Anchoring device structure

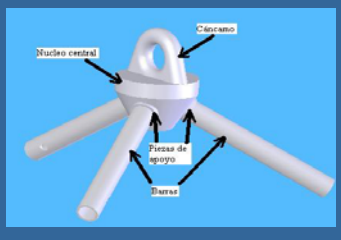
SUCTION PADS AND ALARMS

The anchoring device has three suction pads. It also has acoustic and light alarms which are activated when the pressure within the suction pads falls below a specified value.

VACUUM PUMP

Vacuum generation: The pump removes retained air once the suction pad comes into contact with the anchoring surface.
Vacuum preservation: The pump extracts the air that is introduced under the suction pad when the equipment is being used.

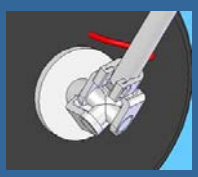
ANCHORING DEVICE STRUCTURE



Eyebolt: This part is screwed securely to the core unit.
Ring unit: This, the most complex part of the structure, joins the eyebolt with the three arms and allows the passage of the cables that run from the vacuum pump to the suction pads.
Arms: The arms, which give the structure rigidity, are hollow so as to enable the cables from the vacuum pump to connect with the suction pads.

Support units: Apart form joining the ring to the arms, these enhance the mechanical resistance of the structura.

BALL-AND-SOCKET JOINTS



The ball-and-socket joints attach the suction pads to the structure in a flexible manner, permitting rotation with two degrees of freedom in the case of our device

CONCLUSIONS

The temporary transportable anchoring device described in this work, currently in the design/fine-tuning phase, is being modelled in a finite element analysis program. It is proposed as a protective device for tasks for which it is not practically or theoretically feasible to use a conventional anchoring system due to the temporality and/or technical difficulty of the task to be performed by the worker.

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