
CONE PROTECTION FOR BITUMEN WORKS AT ROAD CONSTRUCTION

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Abstract

The 'Cone Protection for Bitumen Works at Road Construction' project aims to develop a more effective and durable cone protection system when bitumen works are carried out on road construction sites. The main objectives of this project includes three aspects, the first is to design a suitable product, the second is to produce the product and the third is to test the effectiveness of the product whether it works or does not work well in terms of heat resistance, durability and those related to it. Strong cone protection that can withstand harsh working conditions is important to ensure the safety of workers and road users, as well as prevent cone damage due to exposure to hot bituminous materials and the movement of heavy machinery. This study will involve the selection of suitable protective materials, the development of a practical design, and the testing of the effectiveness of the system in actual site conditions to ensure that it works properly. It is hoped that this project can improve safety at the construction site and minimize maintenance and equipment replacement costs.

Keywords: Bitumen, Cone protection, Road construction.

INTRODUCTION

A traffic cone is a vital safety device commonly used to manage and regulate traffic flow while warning road users of potential hazards. Typically utilized by road maintenance personnel, these cones play a crucial role in assisting users navigating areas under repair and maintenance, ensuring their safety. The implementation of traffic cones is essential in preventing accidents during ongoing maintenance operations by alerting drivers to obstructions or changes in the road environment.

However, observations conducted with the Dungun District Public Works Department revealed several issues related to the current use of traffic cones. One significant problem identified is the accumulation of bitumen dirt on the cones during road maintenance. This sticky substance adheres to the surface of the cone, creating a layer of pollution that compromises its functionality. Existing traffic cones lack any protective features to shield them from bitumen contamination. Over time, the accumulated dirt obscures the reflective stickers on the cones, significantly reducing their visibility. This issue becomes critical during nighttime or heavy rain, when clear visibility is paramount for ensuring safety. Consequently, the inability of the cones to maintain their reflective properties renders them less effective in preventing accidents and guiding road users.

To address this issue, a practical and cost-efficient solution involves designing an enhanced traffic cone equipped with protective features to resist bitumen contamination. By incorporating such protection, the cones would retain their reflective properties and maintain their functionality even in challenging conditions. This study aims to assess the effectiveness of this innovative cone design in road construction projects within the Dungun district. The findings will provide valuable insights into improving traffic management tools, ensuring greater safety for road users, and enhancing the

efficiency of maintenance operations. This solution not only tackles the problem but also supports the broader goal of safer and more reliable traffic control systems.

LITERATURE REVIEW

Traffic management is an essential component of road safety, particularly during maintenance and construction activities (Ismail, 2019). Safety measures such as traffic cones are critical in guaranteeing the smooth flow of vehicles and preventing accidents (Saillaja *et al.*, 2024). Traffic cones are composed of durable materials like polyethylene or PVC and are designed to be highly visible, frequently with reflective strips for usage in low-light or poor weather conditions (Wang, 2006). However, external factors such as bitumen contamination during maintenance activities can affect the efficiency of these cones.

Challenges in Traffic Cone Usage

Several studies have highlighted difficulties with traffic cone pollution. Bitumen, a sticky byproduct typically used in road construction, may stick to cones and cover their reflective qualities. According to a Transportation Research Board study, pollution limits visibility, providing considerable risks to drivers, especially at night or during severe weather. Furthermore, the lack of protective measures in traditional traffic cones worsens the situation, as cleaning the cones become time-consuming and frequently unfeasible during active projects.

Proposed Solutions

Research suggests that innovations in traffic cone design can address these challenges. For instance, incorporating protective coatings or detachable covers can shield cones from bitumen contamination. Such features not only prolong the lifespan of the cones but also ensure their effectiveness in guiding traffic safely. Furthermore, advanced materials such as nano coatings have been explored for their potential to resist dirt and enhance durability. (Morrison, 2018).

Relevance to Local Context

In the Dungun district, road maintenance activities frequently expose traffic cones to bitumen pollution, reducing their usefulness. A study tailored to this context could look into implementing protective features and assessing their cost-effectiveness and usability in real-world scenarios.

RESEARCH METHOD

This study is divided into three phases, namely the product production phase, product testing and the data collection phase of the effectiveness of product use. This product has been produced based on data collected with the help of the Dungun District Public Works Department, Terengganu. The design of the product is based on the standard size of traffic cones used for road projects in Dungun, Terengganu. The material used is transparent plastic. Figure 1 shows the details of the developed product.

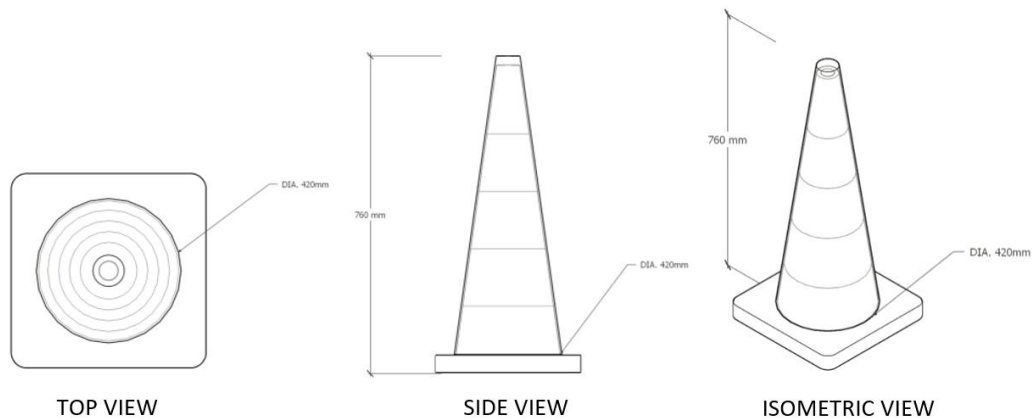


Figure 1. Cone protection detail drawing

This study collected data utilizing a quantitative research method, specifically a structured questionnaire. The questionnaire was developed to extract feedback from road construction workers on the problems and effectiveness of traffic cone protection employed during road repair, with a special emphasis on bitumen contamination. The prototypes were given to the construction workers to be tested on the road work. Figure 2 shows one of the prototypes used in the study. The study's target group included construction workers who were actively involved in road maintenance projects in the Dungun district. This group was picked based on their firsthand knowledge and expertise with the practical application and issues of traffic cones. Figure 2 shows how the cone protection was tested on site. Purposive sampling was used to guarantee that respondents had appropriate knowledge and experience with the issue.



Figure 2. Prototype of the cone protection



Figure 3. Cone protection was tested during road maintenance work

To guarantee validity and reliability, the questionnaire was pilot tested with a small group of construction workers. Feedback from the pilot test was used to improve the questionnaire's clarity and relevance. Data was gathered over a two-week period and analyzed descriptively to discover common trends and themes. The findings provide significant insights into the actual issues that construction staff confront, as well as guidance for the creation of new methods to improve traffic cone effectiveness in road maintenance works.

RESULTS AND DISCUSSION

According to Figure 3, almost half of respondents (47.6%) believe that the biggest issue with traffic cones is that they break quickly. Other main issues encountered include being readily polluted (26.2%) and finding it difficult to clean (23.8%), with just a small proportion (2.4%) reporting that cones are frequently misplaced. This demonstrates that the primary goal is to make the cone more durable and easier to maintain.

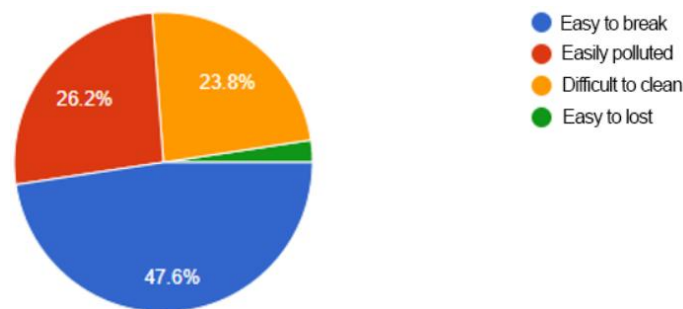


Figure 3. The main problem faced in the use of traffic cones in road maintenance

Based on Figure 4 below, the chart illustrates the results of the survey with 42 respondents, the vast majority, 81%, agreed that this product is appropriate for use in road construction. A total of 16.7% of respondents thought "maybe" was appropriate, with only a small percentage disagreeing. It can be concluded that the majority of respondents agreed with the use of the designed cone protection in road construction and maintenance and believe it has a high potential for acceptance.

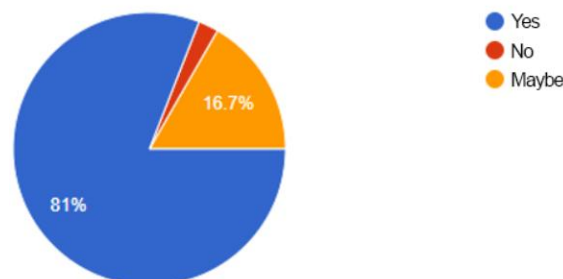


Figure 4. The suitability of this product to be used in road maintenance

According to Figure 5, the majority of respondents (66.7%) believe that this product performs effectively in any weather conditions. A total of 21.4% of respondents thought it may be useful, while 11.9% disagreed. As conclusion, respondents have a relatively high level of trust that this instrument

will operate effectively in any weather condition, though a small minority still doubt or disagree with its effectiveness.

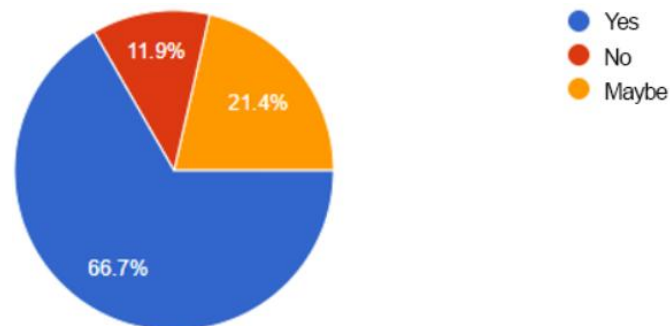


Figure 5. The suitability of this product to be used in any weather conditions

Referring to Figure 6, the majority of respondents (50%) anticipate that the cone protection will last more than 4 months before needing replacement. A total of 19% of respondents expect durability between 3-4 months, 16.7% expect 1-2 months, and 14.3% believe less than a month is adequate. This demonstrates that most users prioritize product durability.

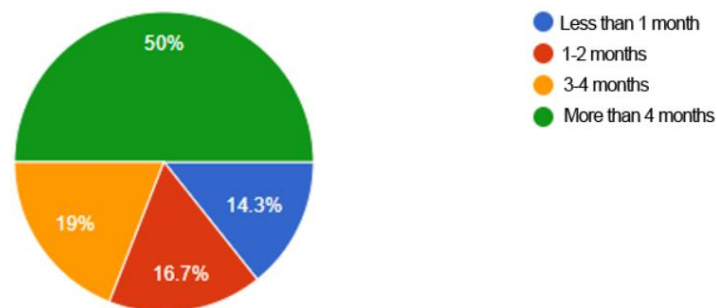


Figure 6. Respondent's expectation on the durability of cone protection

According to Figure 7, a significant percentage of respondents (92.9%) are willing to promote this product to colleagues or other companies, while just 7.1% are unwilling to do so. This demonstrates that the product has a high level of consumer satisfaction and a strong market potential.

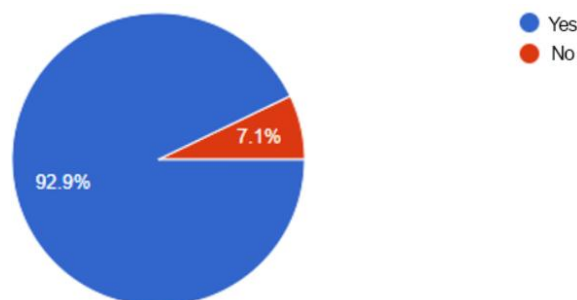


Figure 7. Respondent's recommendation to promote cone protection to others

CONCLUSION

The development of cone protection to safeguard traffic cones in road maintenance projects has a significant positive impact on the road maintenance process. The most significant benefit is the cost savings associated with replacing cones due to bitumen contamination. It also saves time on cleaning the cones, which would otherwise take a lengthy time. However, further research is needed to determine which materials are most suited for usage as cone protectors. The investigation needs to be conducted over a longer length of time to determine the product's effectiveness against weather conditions. Overall, the majority of respondents strongly support using this product in road maintenance projects since it may solve the problems they have been experiencing. A cost comparison study is also required to assess the cost difference between cone replacement and the use of cone guards. This product is not yet available on the market, but its production will provide a new face to road maintenance programs.

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