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VISIBILITY OF POLICE ON ROADWAYS - A MATTER OF LIFE OR DEATH

MICHAEL HAMPSON

Background

Over the past few years police officers have been involved in a number of incidents where their visibility to motorist has been questioned. The activities performed around roadways may differ, however the primary concern is visibility to traffic travelling past or through those workplaces. Personal visibility is achieved by using high visibility safety garments.

High visibility of safety garments is normally achieved by use of fluorescent materials for daytime use and retroreflective materials for night time.

In daylight, when certain substances are irradiated by a source of UV radiation, (not visible to the human eye) they are seen to glow vividly. Fluorescent materials emit radiation which are nearly always of longer wavelength than those producing the effect. In other words, UV light (short wavelengths) is absorbed and visible radiation (longer wavelengths) is emitted.

By day, particularly in twilight, fluorescent colours are brighter than ordinary colours. At night, artificial light sources contain little, if any, short wavelength radiation and fluorescent colours are no brighter than ordinary colours.

For night time visibility retroreflective material is added to safety vests. When a directional light (car headlight) shines on the material, it reflects a bright light beam back to its original source in a narrow cone of light.

Current Reflective Safety Vests

Investigations into the use of our current reflective safety vests identified issues such as:

- wearing of the vest made them feel too hot
- not suited to day visibility
- no standardised vest
- not required to conform to any standard
- issued to a car not a person
- had no maintenance program
- questionable visibility of old vests

Standards

In Australia at the present time, there is no specific standard that applies to reflective safety vests. In June 1993 a draft standard was issued for public comment. A decision to revise and reissue that draft for public comment, followed the release of the European Standard BS EN 471 of 1994.

Australia modelled its draft standards, DR 96028 & DR 96029 similar to the overseas standard.

The QPS Logistics Branch tendered for reflective safety vests in accordance with the requirements of the draft Australian Standards. Tender document - Specifications N0.24 issue UO57 Reflectorized Safety Vests.

The QPS Tailor carried out preselection tests on all reflective safety vests received as a direct result of the tender document.

They were:

- Retroreflective readings - before and after industrial wash test
- Industrial wash test
- Heat test
- Visual inspection for quality and workmanship

As a result of these tests, two vests have been ruled out and two were selected for practical testing.

Testing

Testing components under DR 96028 & DR 96029 Standards, are for materials only. Tests are conducted for the fluorescent dyes and the retroreflective materials, however there is no mention of any practical testing components for specific industries. Research of all Australian and some overseas police agencies revealed that no real formalised practical testing procedures existed for reflective safety vests with respect to police activities.

A practical test schedule was designed to reflect a fair evaluation of what situations a reflective safety vest might be used under.

A series of tests were carried out for the lemon/yellow and orange/red colours specified by the draft Australian standard. Two enhanced vests were designed to improve the standard which had opposing colours placed around the lettering of police. The cross on the back of the reflective safety vest was replaced with the same wording and enhancement as the front.

Testing was scheduled to take place in the day time, night time and sunset. Night time testing included headlights on high beam and low beam. Sites were selected for:

- Major city street (4 lanes of traffic)
- Normal suburban street (2 lanes of traffic)
- Buildings
 - outside a shopping centre
 - a large green vegetation site.
- Night time had 3 set locations within each site:
 - before a street light
 - under a street light
 - after a street light.

Special conditions were introduced such as:

- Daytime testing
 - being located in the shadows of trees and buildings
 - front on
 - back on
 - stationary and moving.

- Backgrounds chosen included:
 - sky
 - green vegetation
 - roadway
 - red earth
 - buildings.

Simulated interceptions were included in the testing.

A digital video was used to film all tests. To prepare for this, the test vehicle was serviced and had its head lights adjusted to specification height. A radar unit was used to record the actual speeds of the test vehicle.

The video camera was secured in the front passengers seat. The set-up of the video camera to simulate eye movement and sensitivity was completed by the film technicians.

The actual test began 1 kilometre from the police officers standing on the side of the road. The video was started prior to the test run, and was stopped once the vehicle had passed the police officers. Each test was repeated.

Results

Determination of the first seen reflective safety vest, was done using the following method. The film was slowed down and advanced until one of the research team identified a police officers reflective safety vest.

The film was stopped at this frame, consensus of the group confirmed or denied this point. If it was not confirmed, the film was advanced until a further sighting, where it was confirmed or denied.

Once this point has been determined, it was recorded and comments added. This procedure was repeated until all colours and vests had been identified. Being a subjective assessment, to combat a bias opinion, the analysis was conducted twice for each test, and agreed upon by all members present.

There are three stages in which the reflective safety vest has to perform, that is:

1. To be first recognised.
2. To be distinguished as a worker from the background
3. Identified as a Police Officer

The lemon/yellow reflective safety vest in all instances, was the first coloured reflective safety vest to be recognised. Whilst not able to readily make sense of what the colour meant, it still made you aware that something was there. The primary concern of the committee was to be seen.

To distinguish the police officer from the background was split between the two colours. Under direct sunlight and under the shade of trees, the red/orange reflective safety vest performed slightly better than the lemon/yellow reflective safety vest. This can be accounted for due to the better contrasting colours of the red/orange reflective safety vest.

When the tests were conducted in low light levels, the lemon/yellow reflective safety vest performed equally to its counterpart, but under very low light levels (dusk) it performs much better.

This is consistent with the eyes reaction to colour. The eyes ability to determine colour falls off during the transition from day to night. The colours with the least amount of energy become hard to detect. The red colour has the least amount of energy, thus is the first colour to lose its ability to be seen.

The testing at dusk also indicated that in the last 30 minutes of daylight, neither the lemon/yellow or red/orange test colours will be seen. Not all motorist will switch on their headlights at this time and this poses an enormous risk to police officers who perform duties on or near the roadway. Artificial light will have to be used in conjunction with the reflective safety vest for the last 45 minutes of daylight.

In the identification stage, the red/orange reflective safety vest outperformed the lemon/yellow reflective safety vest. The test results indicate that no one vest is perfect over all three test stages. A compromise between the two different colours is needed to ensure all situations in the three test stages are covered. The performance of the lemon/yellow reflective safety vest, needed to be changed to reflect the contrast and performance that is displayed by the red/orange reflective safety vest. This was achieved by enlarging the red/orange strip around the lettering of POLICE.

Criteria for new Reflective Safety Vest

The new reflective safety vest will be lemon/yellow in colour. The front and back will have the word POLICE on them. There will need to be an enhancement of the word POLICE. This will be achieved by surrounding the word POLICE with a strip of red/orange colour.

The new style reflective safety vest should be introduced and issued on a personal basis to all police officers.

All vests not meeting the draft standard should be withdrawn from service immediately after the new style reflective safety vests are issued.

Procedures should be reviewed to reflect the performance results of the reflective safety vest in the last 30 minutes of daylight.