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TM-I6-93 Quick Don Gas Mask

By: **Sgt. W.R. Papple**
Canadian Police Research Centre

TECHNICAL MEMORANDUM

Submitted by
Canadian **Police Research Centre**

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SUMMARY

The objective of this project was to design and build a prototype gas mask retaining system that would permit one to don a gas mask without removing the riot helmet. In essence the gas mask, when deployed, would be affixed directly to the riot helmet.

The Biokinetics and Associates Ltd. Mark IIIA riot helmet was chosen as it meets the Canadian Standards Association standard for police riot helmet and faceshield protection. The MSA and Racal gas masks were chosen for modification of their retention systems. Their original retaining systems were replaced with a strap of flexible webbing material that can attach directly to the riot helmet. Two different methods of attachment were fabricated. With either system, the wearer does not need to remove the helmet to attach the gas mask.

These two prototype systems were evaluated by RCMP Headquarters tactical troop members. They supported the concept of a quick-don gas mask. Problems, however, were observed with maintaining the mask seal when the wearer is physically active and also with fogging of some mask visors.

This RCMP technology has been transferred to a Canadian company for commercialization.

RÉSUMÉ

Ce projet portait sur la conception et sur la fabrication d'un prototype pour un dispositif de retenue du masque à gaz utilisé par les membres des troupes anti-émeute, qui leur permettrait de mettre leur masque à gaz sans enlever leur casque. Essentiellement, le masque à gaz devait pouvoir être placé directement par-dessus le casque anti-émeute.

Pour ce projet, on a utilisé le casque anti-émeute Mark IIIA, de Biokinetics and Associates Ltd. Ce casque est conforme aux normes de l'Association canadienne de normalisation pour les casques et les visières de protection anti-émeute pour la police. On a aussi sélectionné les masques à gaz MSA et Racal, et le dispositif de retenue de ces masques a été modifié pour répondre aux exigences des troupes. Le dispositif original a été remplacé par une sangle souple pouvant se fixer directement sur le casque anti-émeute. Deux différents dispositifs de fixation ont été conçus et fabriqués. Avec l'un ou l'autre de ces deux dispositifs, il n'est plus nécessaire d'enlever le casque anti-émeute pour mettre le masque à gaz.

Les deux prototypes ont été évalués par les membres des troupes anti-émeute de la Direction générale de la GRC. Ceux-ci ont approuvé le concept d'un masque à gaz à pose rapide. Toutefois, on a observé que le nouveau dispositif de retenue présentait des problèmes au niveau du maintien de l'étanchéité du masque lorsque l'agent est physiquement actif, et des problèmes d'emboîtement de l'oculaire du masque.

Cette technologie, mise au point pour le compte de la GRC, a été transférée à une compagnie canadienne chargée de sa commercialisation.

QUICK DON GAS MASK PROJECT

Operational Requirement:

Law enforcement and corrections agencies that issue their crowd control units (i.e. riot troops) with both gas masks and riot helmets have found that their members are especially vulnerable for the period of time that the gas mask is being put on. This is because with conventional gas masks, the wearer must remove the riot helmet then don the gas mask then replace the helmet. In cases where the use/presence of tear gas arises suddenly or unexpectedly, the deployment of the gas mask may be difficult and time consuming. The wearer is especially vulnerable to a blow to the head during this time when the helmet is off while donning of the gas mask.

Project Objective:

The objective of this project was to design and build a prototype gas mask retaining system that would permit one to don a gas mask without removing the riot helmet. In essence the gas mask, when deployed, would be affixed directly to the riot helmet. Commercially available riot helmets and gas masks are to be used, albeit in modified form, in concert with this proposed retaining system.

Detail:

The Biokinetics and Associates Ltd. Mark IIIA riot helmet was chosen as it is the only helmet (that the C.P.R.C. is aware of) that meets the Canadian Standards Association standard for police riot helmet and faceshield protection.

Initially three gas masks were considered for use with the quick don gas mask system: the MSA gas mask, the Racal gas mask and the SNC-C4 gas mask. However, because of the lack of a rigid frame on the SNC-C4 gas mask, it was determined that its use with a quick don attachment mechanism was not feasible.

In phase I of this project a rigid metal retaining system was designed and fabricated which affixes permanently to the gas mask. The mask would then, in essence, clip onto the riot helmet. This design was found in field evaluations, by the R.C.M.P. Headquarters tactical troops, to be unsuitable. Although coarse adjustment of the retaining system was possible, the harness did not permit fine adjustment of the mask positioning while wearing the mask.

In phase II of this project, the rigid metal portion of the retaining system was replaced with a strap of flexible webbing material. Two different systems as described below were fabricated:

System 1: System 1 does not require any modifications to the helmet. It consists of a strap with one end attached to a gas mask through an adapter bracket. The other end of the strap is fed through an adjustment mechanism that can be hooked onto the current brackets of the mark IIIA riot helmet. The mask is tightened onto the face by pulling on the free length of strap. The attachment straps are loosened by pulling out on the adjustment mechanism.

System 2: System 2 consists of a strap that is attached to a gas mask through an adapter bracket. The free end of the strap is fed through an adjustment mechanism connected to an attachment ring. The gas mask is attached to the helmet by hooking the attachment rings of the gas mask straps onto mounting hooks that are permanently installed on the current brackets of the Mark IIIA riot helmet. The mask is tightened onto the face by pulling on the free length of strap. The attachment straps are loosened by pulling out on the attachment rings.

With both systems, the wearer does not need to remove the helmet to attach the gas mask. However, the chin strap must be unfastened before the gas mask is donned. The manufacturer recommends that once the mask is donned, the chin cup is removed from the chin strap and the chin strap refastened.

These two phase II systems were also evaluated by the R.C.M.P. Headquarters riot troops. They found them a significant improvement over the phase I model. They made the following observations:

- maintaining the face seal integrity of the quick don gas mask was difficult at times; especially under adverse conditions found during a physical confrontation.
- maintaining the face seal integrity of the quick don gas mask was difficult at times if the user wears eyeglasses. In such cases the seal is vulnerable at the sides of the face where the eyeglass arms touch the gas mask.
- several members reported serious fogging of the gas mask face shield. This was not a design problem of the attachment mechanism but one of the mask itself. The fogging is minimal if the nose piece within the mask makes a relative tight seal around the mouth and nose. This prevents moist exhalation from escaping into the air around the wearer's eyes and condensing onto the cool visor. This exhaust is instead vented directly out of the gas mask.
- some members reported difficulty with the clearance between the gas mask and the helmet face shield or the gas mask and the helmet.

Conclusions and Recommendations:

- (1) If the crowd control unit is expected to be exposed to tear gas or toxic vapors while on the line and with little advance warning of their presence, a quick don type helmet/mask system is highly recommended
- (2) If the crowd control unit has advanced knowledge that it will be using tear gas or be exposed to other toxic vapors, conventional gas masks can be donned in advance of engagement. In such a scenario a quick don type helmet/mask system is of little advantage over conventional gas masks.
- (3) careful sizing of the helmet and mask is recommended in order to ensure that face seal integrity is maintained even under adverse conditions
- (4) careful selection and sizing of the gas mask be followed to ensure adequate nose seal in order to minimize internal fogging of the gas mask visor