

Assessing Next-Generation Construction Helmets



The KASK - Zenith and Superplasma Helmets

Skanska's Advancement In Head Protection Pilot Program

Current Status

Currently, Skanska uses the MSA V-Gard as its primary choice of hard hat head protection. This hard hat was introduced to the US 56 years ago. The V Guard (and all other regular styles of hard hats) primarily protects against objects striking the crown of a person's head. This type of head protection offers minimal, if any protection to the front, rear and sides of the head.

Comparatively, head protection such as the KASK helmet (not a hard hat) offers much more protection. Although it is listed as Type I head protection, it has passed ANSI Type II impact tests to the front, rear and sides.

The Need for Change

Skanska USA is investigating the advancements of head protection for employees working on its projects. Helmets being piloted on our projects include products from KASK, MSA Nexius, and 3M X5000.

There are many reasons why we are looking to improve the current head protection. The primary reason is the fact that head injuries of all classifications still occur on our projects. These injuries vary on the spectrum of severity, from minimal in nature to catastrophic. Plain and simple: changes in head protection are needed in our industry. Skanska is looking to champion these efforts through an in-depth evaluation of different types of head protection, including the KASK helmets described in this white paper. **A thorough list of the reasons for change include:**

- During any fall incident (slips, trips and falls from the same level, falls from ladders, falls from wall forms, etc.) the current hard hat is prone to fall off a worker's head prior to impact because of the tendency for the head to "snap backwards," leaving the head exposed when protection is most needed.
- Traditional hard hats have a tendency to fall off when a worker is bending forward or looking up.
- Traditional hard hats have no high density foam liner to absorb impact to the top, sides, front and rear of an employee's head.
- The suspension system in the V Gard is antiquated and has been used for 50+ years.
- There is no integral chinstrap to keep the head protection in place in the event of a fall, while leaning over or looking up.

NIOSH Traumatic Brain Injuries / Study

The National Institute of Occupational Safety and Health (NIOSH) recently released a study that stated that “Construction workers sustain more traumatic brain injuries than employees of any other type of workplace in the United States.” According to the report, traumatic brain injuries represented one-quarter of all construction fatalities during the eight-year study period. More than half of fatal work-related traumatic injuries were a result of falls – particularly from roofs, ladders and scaffolds. Workers 65 and older were nearly four times more likely to sustain a fatal traumatic brain injury than workers 25 to 34 years old. Meanwhile, workers at organizations with fewer than 20 employees were more than 2.5 times more likely to die from a traumatic brain injury than those who worked for organizations with more than 100 employees.

NIOSH has noted that more than 2,200 workers died of a traumatic brain injury from 2003 to 2010 in the construction industry.

Skanska Pilot Program

Skanska USA began a pilot program in 2016 in the Washington, DC area that has received positive feedback. Employees reported that the helmets felt lighter and more comfortable, and overall, they felt safer wearing this product. The helmet also initiates safety conversations at all levels about the unique head protection and overall safety where they are being worn.

A more formal program, the Advancement in Head Protection Pilot, was rolled out in January of 2017. In this pilot, helmets were distributed to various areas across the US and surveys were taken at the beginning, middle and end of the pilot. The results proved that the helmets were an overall success and employees gave positive reviews about the product.

Numerous Skanska employees are piloting the KASK Safety Helmets throughout the US. Examples include the roll-out of project teams in the Washington, D.C. area, mandatory deployment on the I-5/SR-16 Project in Tacoma, WA, where 150 helmets were bought and are in use and at the SFO Air train project in San Francisco, CA. In all areas where the KASK helmets are being tested, very positive feedback was given by employees.

Hard Hat Types and Classes

Protective helmets are categorized by impact type and electrical class. **There are two types of helmets based on the level of protection they provide from impacts:**

- Type I helmets are intended to reduce the force of impact resulting from a blow only to the top of the head.
- Type II helmets are intended to reduce the force of impact resulting from a blow to the top or side of the head.

Helmets are also designed to reduce electrical shock when working near exposed electrical conductors that may contact the head. **There are three classes of helmets based on the level of protection they provide from electrical hazards:**

- Class E (Electrical) helmets are intended to reduce the danger of contact with higher voltage conductors and are proof-tested at 20,000 volts.
- Class G (General) helmets are intended to reduce the danger of contact with low voltage conductors and are proof tested at 2,200 volts.
- Class C (Conductive) helmets are not intended to provide protection against contact with electrical hazard.

Why KASK

KASK, based in Italy, specializes in developing, designing, and manufacturing safety helmets. They are at the forefront of helmet manufacturing for cycling, skiing/ snowboarding, rock climbing, equestrian sports, rescue and construction helmets. Their only product line is head protection, and thus, they are experts in helmet manufacturing.

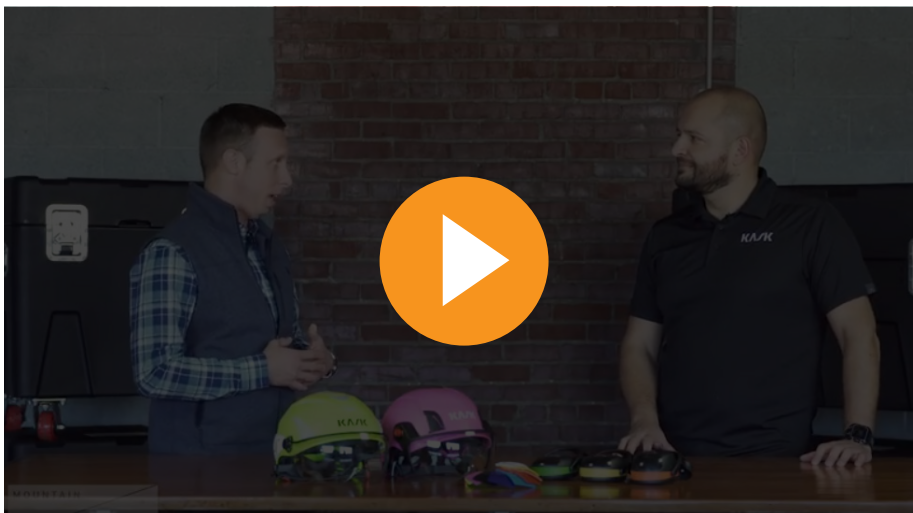
The helmets offer an integral chin strap and more importantly, an expanded polystyrene system (foam) inner shell which attenuates impact energy, thereby decreasing the magnitude of the impact force to the head and reducing the likelihood of concussions and other head injuries. High density foam liners are typically found in helmets with a Type II impact rating. Although the KASK helmets only have an ANSI Type I rating, with the added protection of the high density foam liner, the helmets passed Type II testing protocol.

There are two types of the KASK helmets that Skanska is exploring: the KASK Super Plasma and the KASK Zenith. Both are Type I, but have passed the ANSI Type II impact test protocols, and offer accessories such as ANSI Z87 Certified face shield that can replace eye protection, hearing protection, reflective tape, clips for head lamps, and integral chin straps.

The differences are detailed below:

- **KASK Super Plasma – Type I Class “C” (conductive):** The KASK Super Plasma is a Type I Class C helmet. This helmet has air vents in the helmet to allow ventilation. This helmet is considered a class “C” or conductive helmet because of the vent holes. However, these vents increase ventilation and breathability, and are therefore provide more comfort in hot weather.
- **KASK Zenith – Type I Class E (electrical):** The KASK Zenith is a Type I Class “E” helmet. This helmet is electrical rated and can be used around live electrical conductors. The type “E” helmet reduces exposure to high voltage conductors and offers dielectric protection up to 20,000 volts. It is a nonconductive product.

Super Plasma VS Zenith



[Watch KASK Superplasma and Zenith Helmets - Product Spotlight >>](#)

Hurdles/Challenges

There are three main challenges or hurdles to the KASK being implemented on all Skanska projects:

- **Change:** Individuals, in general, are resistant to change. These products look and feel different because they are different. Our existing hard hats have not changed in over 50 years, thus this product looks unlike any that our workforce is used to. Also, employees use their hard hats as a status symbol. They take pride in the amount of experience they have, the projects they have worked on and wear and tear on their hard hat. Over the course of years in the field, employees are given stickers associated with projects they have worked on, training received and the trade /union they belong to. These hard hat stickers serve as status symbols to employees and years of experience, making them reluctant to start with a brand new hat.
- **Appearance of Helmets:** These helmets look extremely different. They look like a climbing / rescue / biking helmets. These looks sway first impressions of the helmet, especially to employees who have been in the construction industry a long time. All employees have been wearing either the same or nearly the same hard hats types for years thus this change is challenging.
- **Cost:** This helmet costs more. The Skanska rate is just \$97 dollars for a logo helmet only. All accessories are an added cost. A helmet with a visor can cost about \$150 dollars. The existing V Guard hard hats cost about \$20 dollars. Scaling that cost across thousands of employees is a barrier. KASK does offer a three-year warranty and a 10-year shelf life versus the MSA V Gard which offers a one-year warranty and five-year shelf life.

Positives / Negatives of Different Types

KASK Super Plasma	
Pros	Cons
<ul style="list-style-type: none"> ▪ Integral chinstrap and swivel ratchet system allows user to position helmet in a secure manner eliminating the risk of the helmet coming off during a fall. ▪ Foam liner protects user from front, side and rear impacts. ▪ Vents allow for helmet to have ventilation and breathability. ▪ 10 year shelf life versus 5 year shelf life of current hard hat. ▪ Innovative – different way of looking at head protection. ▪ Offers significantly more protection than typical hard hats. ▪ Integrated visor provides eye protection so that employees do not have to wear eye protection when visor is in use. ▪ Prescription eyewear can be worn under the visor. 	<ul style="list-style-type: none"> ▪ Class “C” Conductive rating offers no electrical protection. ▪ Cost – more expensive than current head protection. ▪ Heavier than current hard hat. KASK Super Plasma weighs 15.8oz versus the current hard hat weight of 13.8 oz. Note the KASK Zenith weighs 15.2 oz. ▪ Hotter than existing hard hat due to foam inner shell in the summer months. ▪ There is no permanent brim on the KASK, which means the visor and safety glasses can get wet during rainy days. ▪ Rain water can enter through the vents on the Super Plasma, getting the employee’s head wet.
KASK Zenith	
Pros	Cons
<ul style="list-style-type: none"> ▪ Integral chinstrap and swivel ratchet system allows user to position helmet in a secure manner eliminating the risk of the helmet coming off during a fall. ▪ “E” electrical rated. ▪ Foam liner protects user from front, side and rear impacts. ▪ 10 year shelf life versus 5 year shelf life of current hard hat. ▪ Innovative – different way of looking at head protection. ▪ Offers significantly more protection than typical hard hats. ▪ Integrated visor provides eye protection so that employees do not have to wear eye protection when visor is in use. ▪ Prescription eyewear can be worn under the visor. 	<ul style="list-style-type: none"> ▪ Cost – more expensive than current head protection. ▪ Hotter than existing hard hat due to foam inner shell. ▪ There is no permanent brim on the KASK, which means the visor and safety glasses can get wet during rainy days. ▪ Heavier than current hard hat. KASK Super Plasma weighs 15.8oz versus the current hard hat weight of 13.8 oz. Note the KASK Zenith weighs 15.2 oz.