PROTECTIVE INDUSTRIAL PRODUCTS

REDEFINING
HAND PROTECTION

WORK SAFELY. WORK SECURELY. WORK CONFIDENTLY.

A NEW APPROACH BASED ON REAL LIFE USE AND RISK

The ultimate objective is for customers to choose the right glove for the right job and that means equating glove specifications to something more realistic, like risk of injury

Over the years, the industry has struggled to equate cut resistance with actual risk. The recent updates to the ANSI 105 and EN 388 will provide a more uniformed approach to assessing the cut resistant performance of gloves across the globe. While this will make the cut scores more comparable, it will not help safety managers determine which cut score is best suited for the job.

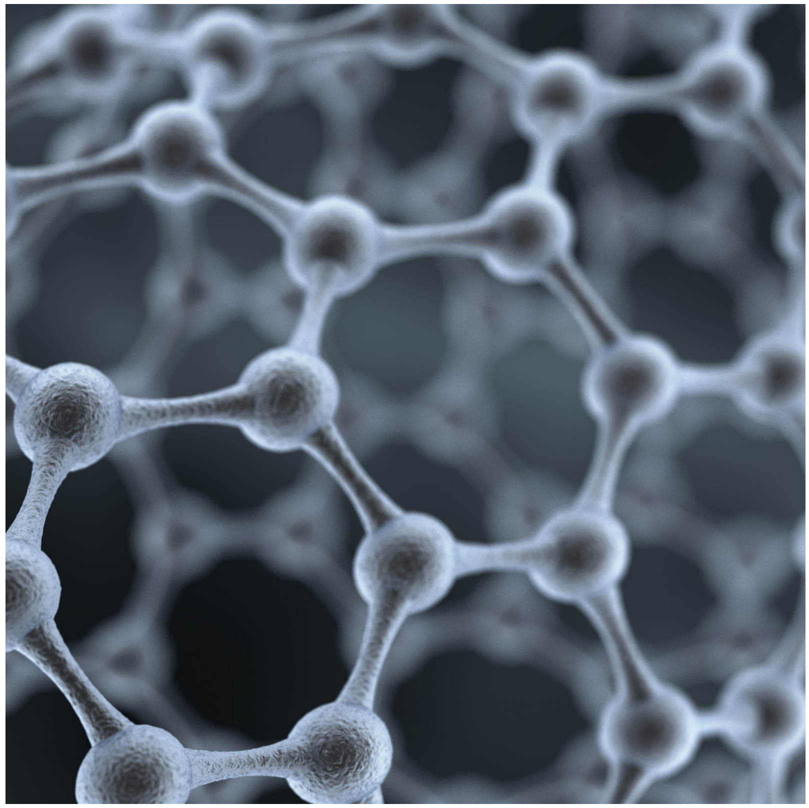
Regardless of these changes in test methods and cut score scales, customers will still ask: "What glove and what cut level should I be using?" When customers don't get a clear answer, they typically err on the side of caution and select the glove offering the maximum cut score, only to discover that the high cost is unacceptable and unsustainable.

The ultimate objective is for customers to choose the right glove for the right job and that means equating glove specifications to something realistic, like risk of injury. It is the intent of this article to outline a new and unique approach to assessing cut risk, which takes a comprehensive look at all factors involved. Before going further, it is important that we take some time to review the basic fundamentals related to cut resistant fibers and types of grip coatings.

MATERIAL BASICS AND PERFORMANCE

Steel and glass were among the first technologies used in cut resistant apparel. Both are naturally hard materials and can be easily formed into sheets or even very thin fibers. Stiffness typically relates to how hard something is, and the greater the stiffness, the greater the possibility of breakage, especially when repeatedly flexing very thin fibers or yarns. This is the reason why steel and glass-based gloves were predominantly replaced with more advanced materials that yielded better performance in flexing. Having said that, glass and steel continue to be used today but are now engineered with more advanced materials such as HPPE (High Performance Polyethylene, such as DSM Dyneema®) and Aramids (such as DuPont® Kevlar®) to produce cut resistant gloves and sleeves that are more comfortable and flexible. Depending on the blend of materials and structure of yarn, we can easily go from a very inexpensive blend (predominantly glass) offering very high initial cut scores, to more expensive engineered yarns that make use of fully encapsulated glass, steel or mineralized materials for ultra-high cut resistance and all-round performance. It is important to highlight that gloves made from predominantly glass fibers achieve high initial cut scores simply by dulling the test blade. However, the inherent stiffness and brittle nature of glass fibers cause it to fibrillate quickly, resulting in possible skin irritation, fatigue and premature wear.

The issues described above has led to the proliferation of High Performance Polyethylene or HPPE, as it's more commonly known, and Aramids such as Kevlar® to become the fibers of choice in providing superior cut protection in gloves and sleeves. Both materials are inherently strong with HPPE offering coolness and comfort, while aramids provide, depending on thickness, light to medium heat protection. Until most recently this superior comfort and performance could only be gained by using higher quality HPPE and aramid-based fibers blended with spandex or nylon for extra flexibility and performance levels.



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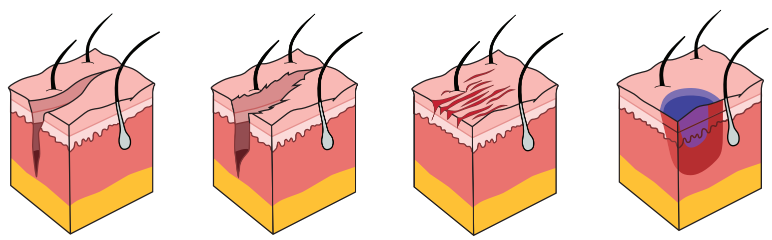
But all that is changing. Today, the approach by leading glove suppliers is to develop proprietary engineered yarns, using HPPE or aramids, along with novel technology that embeds, encapsulates or blends multiple strong fibers such as glass, steel or mineral-based materials that, until recently, could not even be imagined – let alone mass produced. Advancement in nanotechnology is allowing us to work with incredibly strong materials, previously thought to be too thick or too stiff. These natural materials can now be formed into nano-thin, highly flexible fibers that when blended or encapsulated with HPPE or aramids, produce a whole new generation of gloves and sleeves that offer sustainable performance and dexterity. The overall benefit to the user is lower cost, higher cut resistance, improved flexibility and outstanding wear performance. That's innovation in today's world.

CHOOSING THE RIGHT PROTECTION

With the advancement in materials as described above, we can feel confident that gloves and sleeves produced today are among the best we've ever seen. However, making the right selection only gets harder with more choices. As mentioned at the beginning of this article, we made a point that cut scores cannot be relied upon as the sole indicator of performance because if it were, then cheap, glass blended gloves with very high initial cut scores would be the glove of choice for everyone. We went on to explain that there has to be more to glove and sleeve selection than simply cut score. In fact, we would argue that we must consider factors in real working applications like the force applied and sharpness of the edge threat, and equate that to the risk of injury.

Understanding the severity and type of cut injuries related to working with one's hands is crucial



INCISION
Cut caused by razor sharp edge – wound is "neat" and edges of the skin are smooth

LACERATION
Cut caused by jagged or rough edge – wound is torn open

ABRASION
Wound in which skin is scraped or rubbed off by a flat rough edge

CONTUSION
Wound where skin is not penetrated, blood vessels under skin are broken. Typically caused by impact

With the exception of contusions, most skin injuries are a result of contact with a sharp edge or even a burred, rough edge on fragile skin. Using a glove or sleeve layer helps reduce the likelihood of damage to the skin. We say "reduce the likelihood of damage to the skin" because it is understood that nothing is truly cut proof. With enough force energy, driven either by motion or weight, almost anything is penetrable.

The extra layer offered by a technical glove today consists of a knitted or fabric liner, coated with a natural or synthetic rubber polymer. Traditional gloves made of thick leather may seem to offer comparable protection, but this is not the case. While leather may offer some abrasion protection, it slices effortlessly when in contact with a sharp edge making it no match for gloves using the latest technology, cut resistant fibers and yarns.

In the case of coating, thicker, tougher coatings will offer extra protection especially when contact with burred, rough edges is a necessary part of the task. An example of this would be handling heavy sheet metal or working with castings. The coating grip also plays an important part in preventing a sharp part or knife from slipping and allowing its blade or cutting edge from making direct contact with the gloved hand or arm.

It can be argued that a cut resistant liner should act as the last line of defense for protecting skin and that avoiding any direct contact with sharp edges. Edge sharpness and force of contact are critical factors in determining whether the glove or sleeve material type will be able to defend against contact with the underlying skin. Proper selection is multi-factorial and for this reason we deemed it necessary to develop a unique approach to help determine the risk and possible severity of an injury.

CRH MATRIX©

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WE INTRODUCE TO YOU THE CUT RISK HAZARD MATRIX™

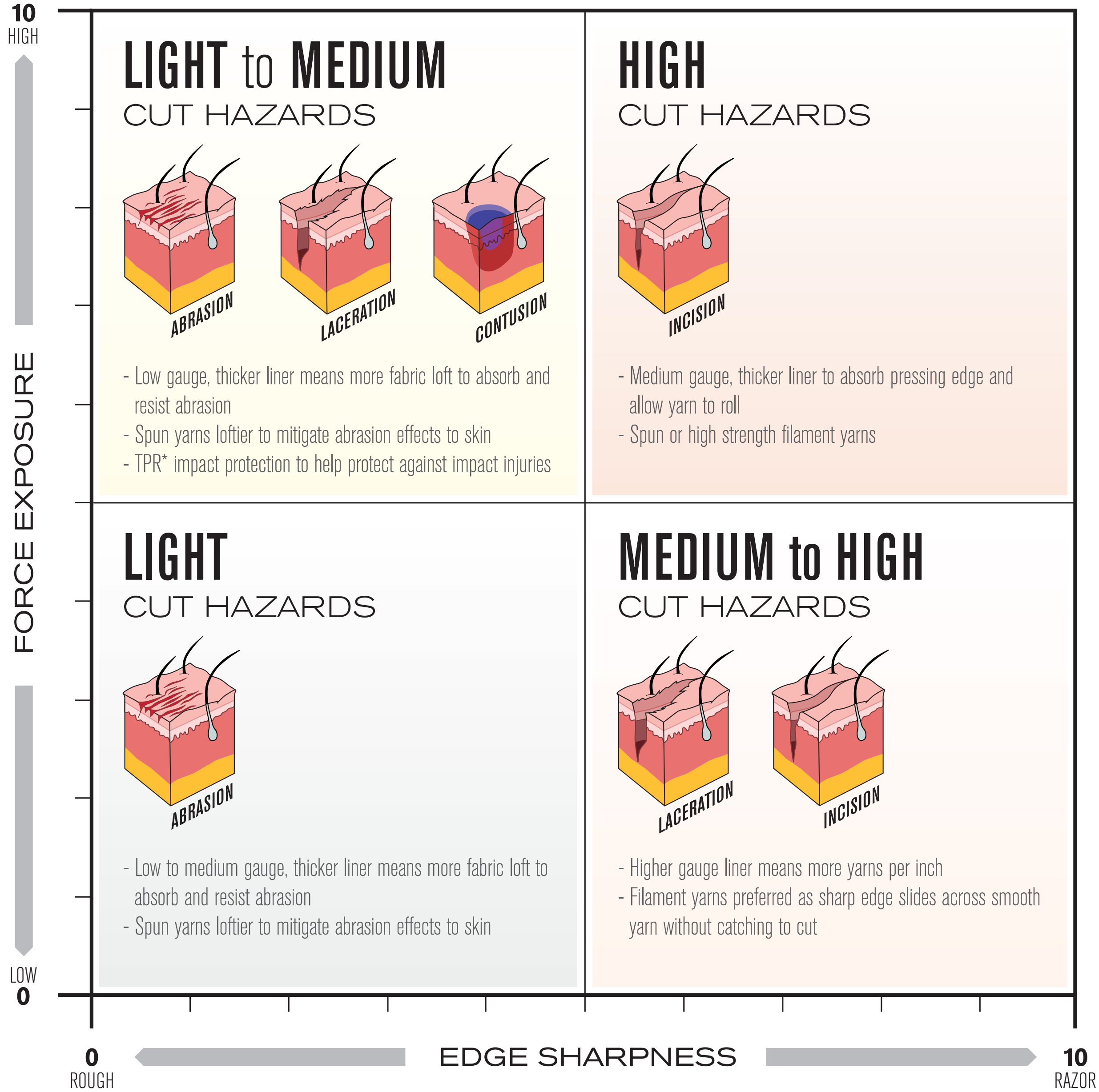
The **CUT Risk Hazard Matrix™** is a unique and logical method to guide users in selecting a glove or sleeve with the right cut resistant material and score. Once a safety manager can identify where their application fits on the **CUT Risk Hazard Matrix™**, they can more confidently correlate the task to the glove or sleeve best suited for their job.

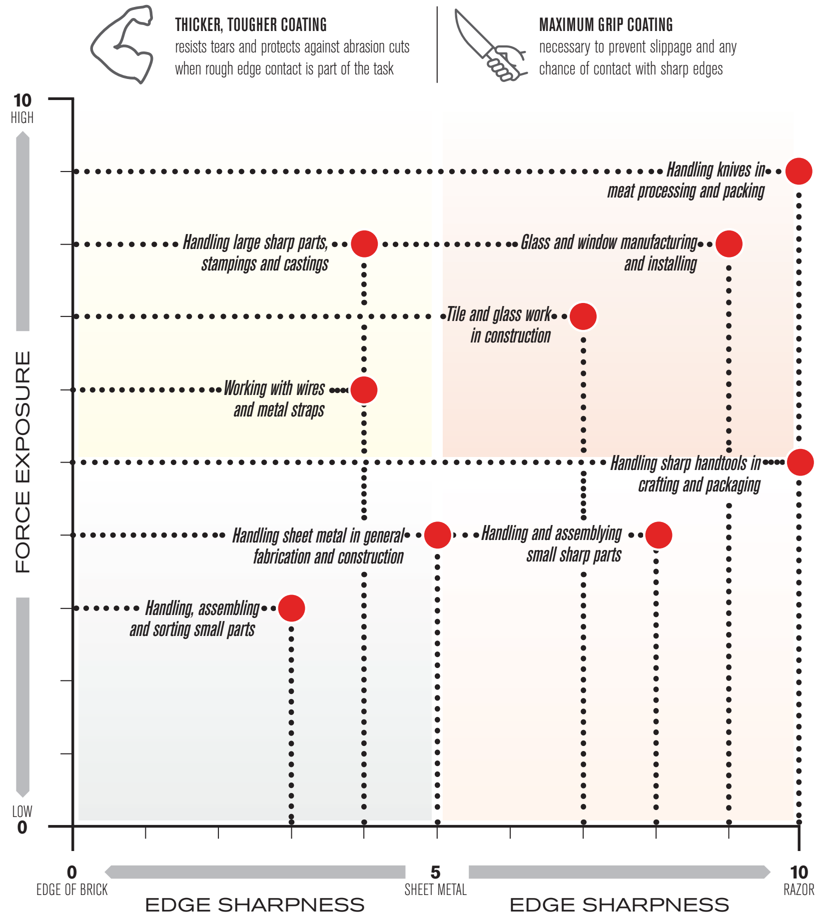
CUT RISK HAZARD MATRIX™

The illustration of the CUT Risk Hazard Matrix™ below demonstrates the factors involved in determining applications for cut resistant gloves or sleeves.

THICKER, TOUGHER COATING
resists tears and protects against abrasion cuts when rough edge contact is part of the task

MAXIMUM GRIP COATING
necessary to prevent slippage and any chance of contact with sharp edges



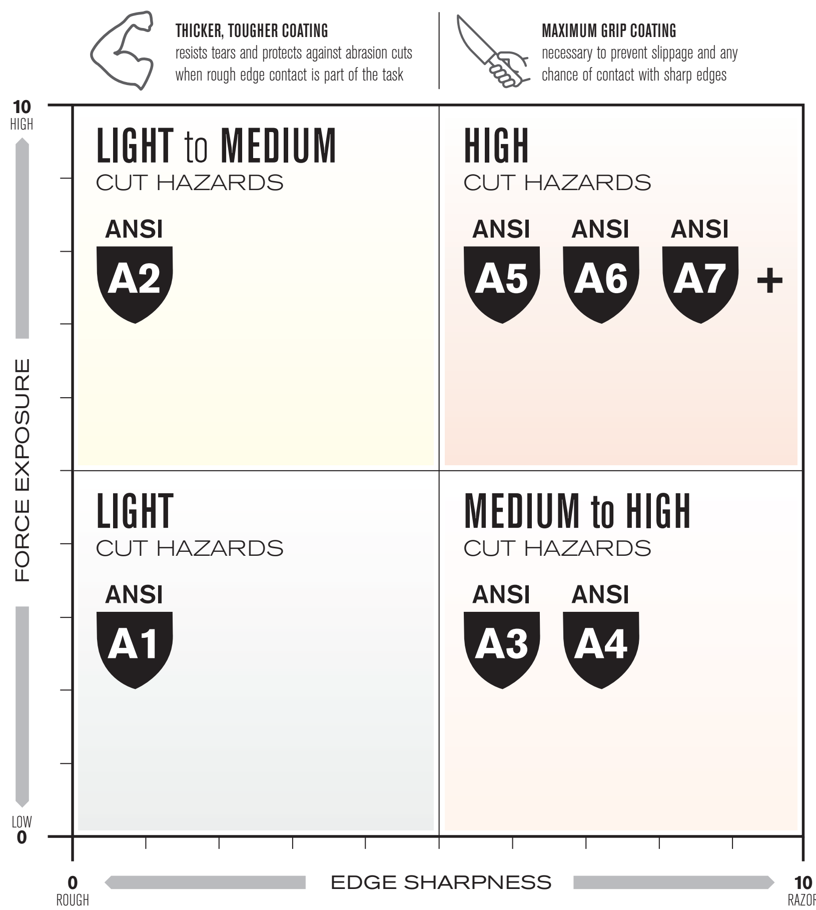


CRH: FACTOR	TASK
9:10	HANDLING KNIVES IN MEAT PROCESSING AND PACKING
8:9	GLASS AND WINDOW MANUFACTURING AND INSTALLING
7:7	TILE AND GLASS WORK IN CONSTRUCTION
8:4	HANDLING LARGE SHARP PARTS, STAMPINGS AND CASTINGS
6:4	WORKING WITH WIRES AND METAL STRAPS
5:10	HANDLING SHARP HANDTOOLS IN CRAFTING AND PACKING
4:8	HANDLING AND ASSEMBLING SMALL SHARP PARTS
4:5	HANDLING SHEET METAL IN GENERAL FABRICATION AND CONSTRUCTION
3:3	HANDLING, ASSEMBLING AND SORTING SMALL PARTS

Above, we've equated cut score factors with real world tasks and applications as examples

By plotting the tasks and applications, we determine a **CUT Risk Hazard Factor**™ (CRH: Factor™) as outlined on the right side. The CRH: Factor™ is a comparative indicator that helps safety managers determine the level of potential hazard related to the task or application. To explain further, the Force Exposure vertical axis tries to relatively quantify how much possible force may be applied if there is edge contact with the glove or sleeve. It is obvious that a higher force will occur when handling heavier or moving parts. The Edge Sharpness axis on the bottom correlates to the sharpness of the cut threat with 10 being a razor-sharp blade and 0 representing a rough edge, such as that of a brick or masonry block.

Correlating these two important factors is essential to determine the possible severity and type of trauma they will produce. Let's use a worker who is handling box cutters in a repacking operation as an example. The force required to open tape on boxes may be determined to be at a level 5, while the edge of the blade is no doubt razor sharp, placing it about 10 on the Edge Scale – altogether we'd express this as a CRH: Factor™ 5:10. Correlating the CRH: Factor™ 5:10 on the CUT Risk Hazard Matrix™ is easily equated to the ANSI Cut Scores, as can be seen in the matrix below.



CONCLUSION

Selecting Cut Resistant gloves or sleeves is not a linear science and choosing the highest cut level is not necessarily the best protection or best product for dexterity and productivity. We can see that proper glove selection is multifactorial and based on understanding the fundamentals of risk and task while carefully assessing the needs. We all seek a one product, one level solution but that is just not the best solution – even with today's advanced fiber materials and engineered yarns. Our goal is to work within the industry to help everyone become better acquainted with proper glove and sleeve selection. We believe that the CRH: Factor™ values help to more confidently assess the requirement and better correlate to EN and ANSI cut scores, while serving as a guide for product selection to meet price points and conditions. As a leading provider of hand and arm protection, PIP believes it is incumbent upon us to help safety managers and workers make confident glove and sleeve selections.

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HAND PROTECTION

PROTECTIVE INDUSTRIAL PRODUCTS, INC.
BRINGING THE BEST OF THE WORLD TO YOU®

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