

**MANDATORY
HEAD & NECK RESTRAINT
DEVICE IMPLEMENTATION**

**REVISED APPROVED LIST
(INCLUDING ALL GENERAL INFORMATION ON NEWLY
APPROVED DEVICES)**

ADMINISTERED BY



FIFTH REVISED EDITION - July 2009

1. Background

Speedway Australia as the peak body for speedway racing in Australia has particular responsibilities in the areas of safety, operations and management within the industry, representing professionals, businesses, operators, drivers and all other participants in the industry.

Speedway Australia has identified in consultation with QBE International, our Public Liability Insurers and QBE Mercantile Mutual, our providers of Personal Accident Insurance, a recent increased frequency of serious injury to competitors.

The implementation of the mandatory use of head and neck restraints in specified divisions along specified timelines is highly recommended and strongly supported by both insurers.

The implementation therefore illustrates to the insurers and to our members our commitment to safety and the reduction of all occurrences of injury, ensuring our insurability at affordable premium levels in future years.

2. Disclaimer

Whilst Speedway Australia has made all reasonable attempts to ensure the accuracy of the material contained in this information pack, much of the information has been obtained from manufacturers and suppliers and Speedway Australia takes no responsibility for the accuracy of this information. The information is current as at the date of this document and Speedway Australia takes no responsibility for ensuring the accuracy of the information subsequent to this date.

The information provided is for general information purposes only and Speedway Australia does not hold itself out to have expert knowledge of each device. Speedway Australia should not be taken to have made any recommendations in respect of the suitability or appropriateness of any device described in this document. Speedway Australia strongly recommends that each participant conduct his/her own independent research into each device and make a judgement on their own behalf as to the device that best suits their particular circumstances and needs. The information contained herein is merely intended to assist each participant in exercising that judgement and should not be relied upon solely as the basis for choosing an appropriate device.

Speedway Australia does not assume any liability for any loss, damage or injury which may result from anything contained in this document.

3. Approved Devices

Speedway Australia's Policy is that all Head and Neck Restraints must be SFI 38.1 Approved. As of 30 April 2007, the following devices are SFI approved (in no particular order). Each competitor must choose and adopt one of the following devices to comply with the conditions of the implementation.

- *Hubbard-Downing HANS Device*
- *Leatt Brace*
- *LFT Technologies R3 Device*
- *Safety Solutions Hutchens-II Device*
- *Safety Solutions Hutchens Hybrid Device*
- *Safety Solutions Hutchens Hybrid X Device*
- *Safety Solutions Hutchens Hybrid Rage*

Other devices may be approved by the SFI Foundation and Speedway Australia in the future. Updates will be posted on the Speedway Australia website when other devices are approved (www.nasr.com.au).

4. Mandatory Implementation Dates

The following racing divisions and dates have been identified as well as the corresponding commencement date in which the use of one of the approved devices will become mandatory.

- *Sprintcars* 1 October 2004
- *All AA and A licensed categories* 1st July 2008
+ Super Sedans but excludes all other sedan categories
- *A horse collar is optional when wearing an approved head and neck restraint device.*
- *It is highly recommended that all other categories wear a head and neck restraint device.*

It is strongly recommended that all Junior drivers wear a head and neck restraint device.

5. Types of Injury

Basilar skull fractures and similar injuries caused by violent head movement have reportedly been the most common cause of death among race drivers over the past 10 years. During an accident when the race car comes to a sudden stop, the laws of physics will keep the body hurtling in the direction of the impact until the torso and shoulders are stopped by the safety restraints. However the head continues forward, causing it to hyper extend, resulting in the tendons and ligaments that attach to the base of the skull to be torn away. This can result in a basilar skull fracture which disrupts flow to the major blood vessels creating massive blood loss while also potentially damaging the brain stem and spinal column.

Head and neck restraint devices assist in preventing some injuries by limiting extreme head motions and neck loads. They are not designed to assist in preventing thoracic and lumbar back injuries.

6. Choosing A Device

The various factors that should be considered when purchasing a device include, but are not limited to:

- *Comfort*
- *The type of helmet needed with each particular device*
- *The specific fastenings needed on specific helmets*
- *The need to drill helmets & associated problems*
- *The use of Tethers*
- *Life expectancy of each device*
- *Device replacement after crash impact*
- *Custom fitment*
- *Distributor support*
- *Ease of use*
- *Cost*

HANS® Device

The origin of the HANS® device dates back to 1981 after Patrick Jacquemart died in a racing incident in Mid Ohio, America after he suffered a basilar skull fracture. After the Jacquemart accident, Michigan State University Engineering Professor Robert Hubbard, who was an expert in crash mechanics and biomechanics focused his attention on preventing such injuries. A HANS prototype was patented in 1989 and first sold in 1991.

There are currently three manufacturers of the HANS device, Hubbard-Downing (USA), SCHROTH (Germany) and Stand 21 (France). All versions are identical in construction and use, and differ in name only.

Collar



Yoke

Tethers

The HANS comprises a collar and yoke system constructed of carbon fibre and Kevlar. The HANS yoke fits under the user's shoulder straps so that the shoulder harness holds the HANS to the user's torso. The HANS collar extends up from the back of the yoke behind the lower part of the users helmet. The device is then connected to the helmet by two tethers attached to the yoke, which assist in limiting extreme head motions and neck loads during an accident.

The picture below depicts head movement from a crash test with accelerations of 45 g's. A distinct comparison can be seen between neck tension, neck load and neck shear with and without the HANS device.

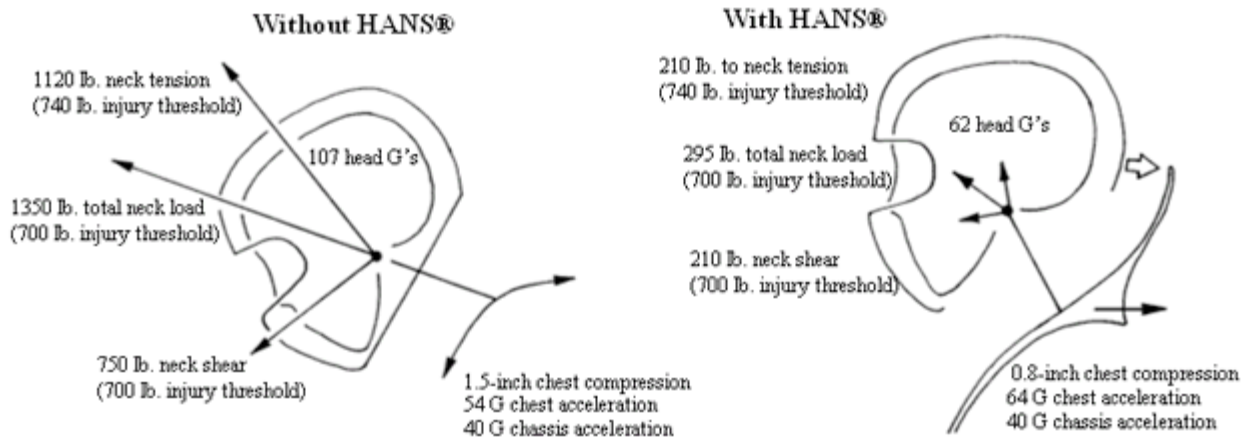


Figure 6. Results from crash test [ref. 1-5] with crash sled accelerations of 45 G's

- Comfort

The shape of the HANS® device has been refined to fit a wide range of drivers. The shape of the yoke and the angle of the collar are the two most significant aspects affecting driver and cockpit. The opening between the forward arms of the yoke must be wide enough to slide the HANS® onto the shoulders around the neck. The area to the sides and rear of the neck should be large enough to fit the user. The outside edges of the yoke should not unduly interfere with the driver's arms or shoulders during driving.

Purchase and correct fitting of a HANS® device should be done through an authorised HANS distributor. However it is easy to find the correct HANS® for your application. All you need is your seatback angle and your neck size. For maximum comfort you want the angle of the HANS® yoke to match the angle of your seatback. This can be measured easily. Here are the seatback angles for common cars:

Model 20 refers to the 'Upright Seat' which is commonly used in speedway vehicles.

Neck size - The width of the collar is sized to fit your neck or shirt collar size.

12 to 15 Inches - Size Small

(S)

15 to 18 Inches - Size Regular (R)

Over 18 Inches - Size Large (L)

So a person with a 16" neck driving a Sprintcar would use a **HANS® Model 20R**.

- Helmet Requirements

In order to use the HANS, the driver needs a helmet fitted with attachment posts so the HANS tethers can be attached to the helmet. It is recommended that an approved HANS installer fit these anchors. However each device comes with instructions, if you intend installing the device yourself.

The helmet must comply with a minimum of either of the two most recent "Snell Memorial Foundation SA ratings"... currently Snell SA 2000 and Snell SA 2005.

- Drilling Helmets and Associated Problems

WARNING: *Any person who intends to modify a helmet for any reason, should approach the helmet supplier before doing so, who in turn can contact the manufacturer if required, to determine if taking such action will void the warranty of the helmet.*

- Tethers

The tether is a flexible connection between the HANS and the helmet, designed to transmit the load exerted by a driver's helmet and head to the HANS during an impact. The tethers on the HANS device are replaceable if they become worn or damaged.

- Life Expectancy

It is recommended that the HANS device be inspected, and if deemed necessary, replaced after a serious accident. The HANS device has no set life limit.

- Replacement after Crash Impact

As with any head and neck restraint it is recommended to have your HANS device inspected by an authorized supplier after any significant impact to determine if any faults or defects have occurred as a result and for it to be replaced if required.

- Custom Fitting

Will be done at no extra cost upon purchase.

- Ease of Use

The HANS device is easy to put on inside or outside of the vehicle, and can be connected by the driver without any assistance.

- Cost

Approximately \$1,800 inc GST.

Please note that prices may differ between suppliers.

- Distributor Support

Hubbard-Downing HANS

Dale Rogers - Revolution Racegear (VIC)

Ph: (03) 9873 8700

Internet: www.revolutionracegear.com.au

Email: sales@racegear.com.au

Refer to the internet for Revolution Racegear offices in your state.

Stand 21 HANS

Michael Jones

Stand 21 (VIC)


Ph: (03) 9593 1199

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Email: info@stand21.com.au

LEATT™ BRACE

www.leatt-brace.com



The Leatt-Brace™ is a Composite (Carbon Fiber and Kevlar) or injection produced neck brace system designed by medical professionals and motorsports enthusiasts to help prevent:


- Hyperflexion: extreme forward head movement.
- Hyperextension: extreme rearward head movement.
- Lateral hyperflexion: extreme sideways head movement.

- Axial loading: compression of the spinal column due to the effect of force on the helmet
- Posterior hypertranslation: rearward movement of the head on the neck.
- Protection of the soft tissue neck structures from the Safety Harness in side impact.

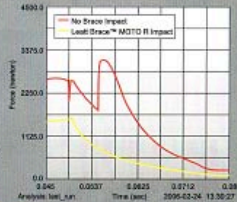
We use accident simulation software and engineering design tools to achieve optimum reduction in neck forces without compromising other body dynamics. The design rationale behind the Leatt-Brace™ is to bring the head to a controlled stop.

This is achieved in four ways;

1. Energy absorbing foam.
2. Flex of the composite.
3. Collapse of the brace. Using a friction slider.
4. In extreme impact, controlled fracture of the brace.



The graph shows, by the use of complex simulation software, that the Leatt Brace™ optimizes and reduces the axial forces transferred to the neck during impact. A reduction of at least 30% in neck axial forces is achieved, which equates to an average of 1000N of force (100kg). This illustrates the effectiveness of the Leatt Brace™. The area between the No Brace and Leatt Brace™ on the graph is equivalent to the amount of energy reduction during the impact as a result of the use of the Leatt Brace™.



• Reduces the risk of Catastrophic Injury to the Cervical Spine (Neck)


• No Equipment Modification

• Not Restrictive

• No Straps


Provisional Patent/PCT/Design Registration
Trade Mark/Copyright

www.leatt-brace.com




- The Leatt-Brace™ does not restrict the driver's mobility to the degree that strap systems do. This seems to be more of a concern amongst drivers than what we initially thought and we receive many compliments on the comfort and driver friendliness of the Leatt-Brace™.
- The Leatt-Brace™ does not require any equipment modification and is compatible with most helmet, seat belt and seat combinations.
- The Leatt-Brace™ does not rely on seat belts to be effective. Our product keeps the seat belts away from the neck structures and at the same time allows the belts to fit more comfortably.
- The Leatt-Brace™ has been tested by the SABS (South African Bureau of Standards) and at BMW's chief test facility in Munich. It is also endorsed by MSA (Motorsport South Africa).

The Engineering of the Leatt Brace™ MOTO R



The above two figures show the effectiveness of the Leatt Brace™. In a 70G Frontal Impact, it can be seen how the range of movement of the Leatt Brace™ vs the No Brace under identical circumstances reduces allowable angle of the head and neck movement at the extreme of the impact sequence.

Reduction in head and neck range of movement results in lower axial neck forces as well as controlled head deceleration by transferring energy away from the head and neck.



For More Information call
1800 108 218

Australia/New Zealand
importers: Autocross marketing

- More Information

Ph : 1800 108 218

Web: <http://www.leattbrace.com.au>

R3 Head and Neck Restraint

The R3 is manufactured by Safety Solutions and is a new concept by them in head and neck restraint systems. The R3 (see illustration) comprises of a 't' shaped support which extends from the rear of the helmet down the users back and buckles around the chest and over the shoulders. The tethers are attached to either side of the top section of the support and attach to the side of the helmet.



- **Comfort**

The R3 can be strapped to the occupant or it can be left in the car and anchored to the seat belt system. In either case, the device has been designed to travel with the occupant during a crash to help keep the relationship of the head and torso consistent.

- **Helmet Requirements**

The R3 can be fitted to any helmet meeting the current minimum standards. The helmet must comply with a minimum of either of the two most recent "Snell Memorial Foundation SA ratings"... currently Snell SA 2000 and Snell SA 2005.

- **Drilling Helmets and Associated Problems**

WARNING: Any person who intends to drill into a helmet for any reason, should approach the helmet supplier before doing so, who in turn can contact the manufacturer if required, to determine if taking such action will void the warranty of the helmet. The Snell certification however will not be voided as long as the fitting instructions are followed closely. Units can be fitted ex-factory if required.

- **Tethers**

Attaches via post clip installation similar to Hans and/or quick release pin system

- **Life Expectancy**

Recommend replacement after severe use or after 3 years of use.

- **Replacement after Crash Impact**

As with any device, the R3 should be inspected after any significant impact and determine if any faults or defects have occurred as a result.

- **Custom Fitting**

Available at no extra cost on purchase from authorized distributor. All units are available in different sizes to suit differing body sizes, coupled with the adjustments they can fit from Juniors up.

- Ease of Use

The R3 can be worn by the driver whilst not in the vehicle, or can be left in the vehicle and attached on entry. All units, once adjusted to fit the wearer, take maximum 1 minute to put on and half that to take off.

- More information

- Distributor Support

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Hutchens II Device

The Hutchens II is now certified to the stringent SFI 38.1 specification. The Hutchens II with no trouble passed the mandated tests like the two previous restraints.

The Hutchens II uses the latest technology in Carbon Fiber & Kevlar strapping to combine the benefits of both styles of restraints. Because the Hutchens II is strapped to you, there is NO issue with the restraint coming out from the seat belts in multiple & side impacts.

The Hutchens II attaches to the seat belt, provides for a clean and simple helmet installation and is engineered for all types of motorsports applications. Available in four sizes, the Hutchens II is an affordable and essential safety precaution retailing at \$750.00. Additional accessories are available to match any racing belt configuration (including camlocks); optional leg straps are also available.

The helmet must comply with a minimum of either of the two most recent “Snell Memorial Foundation SA ratings”... currently Snell SA 2000 and Snell SA 2005.

More information on the Hutchens II and other motorsports safety products can be found on their website at www.hutchensdevice.com.



Hutchens Hybrid Device

The New Hutchens Hybrid head and neck restraint is the most recent SFI 38.1 Certified head and neck restraint. The Hybrid resets the bar in head and neck restraint technology. Safety Solutions and LFT Technologies now have 4 of the six SFI 38.1 Certified head and neck restraints.

Safety Solutions and LFT Technologies have combined years of experience and multiple patents to come up with the ultimate head and neck restraint. The Hutchens Hybrid outscored the leading competitor's device, by 2.5 times in the 30 degree frontal SFI test. The Hybrid uses a small carbon section and multiple load paths to create a device that out performed the competition in frontal impacts, the Hybrid reset the bar in the angled impact.

The Hybrid uses a chest strap and front buckle attachment along with increased shoulder belt engagement to produce the most secure and effective head and neck restraint ever. The low back on the device helps getting in and out of the race car.

The helmet used must comply with a minimum of either of the two most recent "Snell Memorial Foundation SA ratings"... currently Snell SA 2000 and Snell SA 2005.

The device comes in four sizes and is currently available at www.lfttech.com.



Hutchens Hybrid X Device

The Hybrid X, a modification of the NASCAR approved Hybrid, was engineered to protect the head in side to side vibrations, as well as protecting the head and neck in frontal and angular impacts that occur in drag racing. The Hybrid's patented technology is a unique adaptation of the R3 technology with increased shoulder belt interaction and a shorter back. The restraint uses a combination of the R3 chest strap and a set of angular front buckle straps that hook into the top of the seat belt buckle system. This arrangement produces a comfortable and stable restraint that excels in angular and multiple impact situations. The Hybrid uses multiple load paths to redirect the head loads and a combination of carbon fiber and straps to make the most secure device ever.

The helmet must comply with a minimum of either of the two most recent "Snell Memorial Foundation SA ratings"... currently Snell SA 2000 and Snell SA 2005.



Hutchens Hybrid Rage Device

Safety Solutions unfolds our latest Technology with customer's needs a top priority. The Hutchen's Hybrid Rage, a Composite counter part to the already popular Hutchens Hybrid Carbon Fiber Model, boasts qualities such as Comfort, Security and Simplicity at a Great Low Price! SFI 38.1 Certified with an easier exit with low top!

Comfortable! Engineered with Molded Seat Pad to Disappear!

The Strap Design is Secure and Effective in Rollover and Multiple Impacts. Available in: small, medium, large and x-large & custom sizes. Seat Angles include: Sprint / Pro-Stock - (65 deg-90 deg seat back)

The Hutchens Hybrid Rage and the R3 Rage Head and Neck Restraints were developed for the sportsman racer, offering tailor fit applications for multiple types of motorsports.

The head and neck restraint leader with the most SFI 38.1 certified devices unfolds the industry's latest cutting edge Technology with the racers needs and safety top priority. The Rage series features the same qualities as the full carbon fiber models such as SFI 38.1 certification, standard quick release tethers (no-up charge), Comfort, Multiple Impact protection, Multiple Angular protection, Excellent Head Movement and Simplicity at an unbeatable value.

The Rage series devices are designed as Carbon Fiber reinforced composite restraints, for their futuristic look and overload protection, not offered by competing injection molded designs.

(Device comes standard with Quick Releases, D-ring Kit, Molded Seat Pad & Installation Manual - everything you need to race!)

The helmet must comply with a minimum of either of the two most recent "Snell Memorial Foundation SA ratings"... currently Snell SA 2000 and Snell SA 2005.



Defnder

Easy to use

At DefNder™ we believe in simplicity through efficiency. All our DefNder™ models are designed with the racer in mind. The easy on design means that you can fit your DefNder™ over your head, as with your helmet, or slide it on from behind. Our Real-eaze quick release is unique in that it incorporates both the quick release and the helmet anchor in one unit. The clever design of the Real-eaze allows you to easily attach or release your helmet from your DefNder™. Real-eaze features a positive lock so that there is never a chance of accidental failure.

Affordable

We are driven by our passion for motorsport. To this end we believe that all motorsportsmen and women should have access to affordable safety technology. The DefNder™ fills this void by offering supreme safety technology at a price that won't break the budget. The Team Issue is only \$549. In addition, the DefNder™ is adjustable between 20 and 40 degrees to suit virtually every cockpit setup.

Key Features

Real eaze quick release and helmet anchor (2 x Helmet anchor, quick release and spanner)

Simple instruction/owner's manual

DefNder™ Hardcase (to transport and store your necks best protection)

Padding for Formfit Belts (comfortable even without, so they are removable)

Baseball Cap

Race car stickers

Environmentally friendly packaging - sleeve is recyclable and hard case is for transporting your DefNder™

Comfort

Comfort is what every race car driver wishes from his or her equipment. We have heard what 1000's of you wanted from your head and neck restraints.... and we listened. Now through our passion for racing and our technologically advanced design developments we are now able to offer you the unparalleled comfort of the DefNder™ neck protection system. All DefNder™ models feature our unique flexible Formfit belts which comfortably follow the contours of your body shape. Our Stabilizer bar design eliminates much uncomfortable upper torso pressure. It transmits minimal pressure both in driving and in impact situations. Working together, our Formfit belts and our Stabilizer bar provide a fit so snug that you will forget that your DefNder™ is even there.

Motion-Max

The maximization of the side to side motion of your head is imperative when racing in a pack, sliding through a forest or flying across the desert. Our intelligent Motion-Max tether (DEKRA Certified 19mm Webbing) system features a load neutralizing horizontal/lateral geometry that offers freedom without

sacrificing efficiency. Our slide cover ensures that Motion-Max will offer unhindered head motion and it will never snag on your seat.

SFI 38.1

The SFI 38.1 is the SFI standard for head and neck restraints. All our models of the DefNder™ neck protection system have passed this stringent certification. Please visit www.sfi foundation.com for more details.

Side impact protection

Our Motion-Max tether (DEKRA Certified 19mm Webbing) system incorporates VST (vertical stabilizing tether) geometry which offers unsurpassed side impact protection while maintaining the free motion of your head. Working in conjunction with this design are our unique harness flares which are designed to work with mandatory 3" safety harnesses. Our harness flares reduce the chances of belt slip in rough conditions and angular impact.

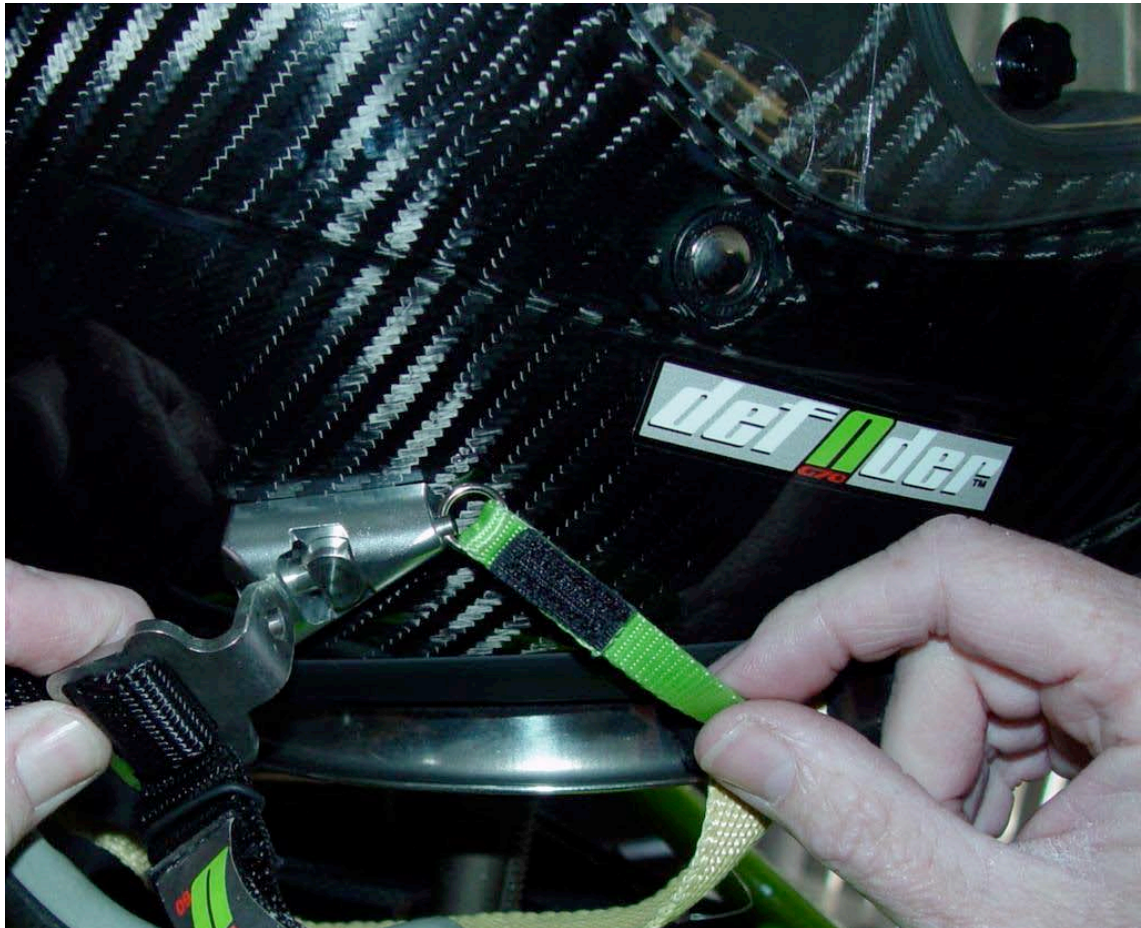




Matt Zimmerly - I-55 Speedway



Tether installed on Real-eze



Real-eze quick release on helmet



2008 USAC Triple Crown Champion Jerry Coons, Jr. at the '09 Chili Bowl

9. Conclusion

Purchase and use of a head and neck restraint is an important and necessary decision which can only be made by the user after careful consideration of the user's individual circumstances. The information contained within this document is supplied with the intention of providing competitors with a 'basic' general overview of all the main features of current approved devices. It is not intended to provide an exhaustive and comprehensive analysis of each restraint and should not be relied upon in this respect. As outlined there are numerous factors involved in the purchase of such an important piece of safety equipment, and these factors will differ from person to person. This document should be used as a basic reference guide only and it is strongly recommended that each user conduct his/her own independent research into each device and where possible approach suppliers themselves to discuss and physically try the device they think will suit them before deciding on any particular device.

10. Further Information

For Further information, clarification or explanations including the structure of the current scheme, please do not hesitate to contact the Speedway Australia Office.

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