Tech Talk: Head & Neck Restraints

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Similarities and Differences

These days every major sanctioning body mandates the use of a head and neck restraint (from this point on, “HNR”) to protect drivers from injuries to the head and neck during an impact. The most prevalent fatal head injury sustained in the days prior to this mandate was the **basilar skull fracture**. Regardless of the racing series you follow, you no doubt know the name of at least one legendary driver who paid the ultimate price as a result of this injury: Dale Earnhardt, Ayrton Senna (sustained a BSF in addition to shrapnel penetration), Adam Petty and far too many others to count.

Luckily, there were those in the industry who recognized that many of these injuries were preventable and began work on a device many years before the mandates started coming down. They worked with medical professionals, racecar drivers and racing engineers side-by-side to find a solution, and in the early days the **Hutchens Device** and **HANS Device** were born.

Thirteen years after the dawn of this new era in auto racing safety and the HANS Device has become synonymous with head and neck restraints. Despite the worldwide name recognition and

instituted mandates across all major sanctioning bodies, the HANS device isn't the only HNR to be found.

Below we're going to talk in general terms about the most popular HNR devices on the market today. We'll offer very candid opinions on strengths and weaknesses, comfort and features, to help you choose the best HNR for your racing needs.

Keep in mind that HNR devices must be re-certified every 5 years. Most manufacturers offer this service for a nominal fee, while others offer re-certification for free.

First, I'll start with the heavy-hitter in the market; **HANS**. These days, HANS is offering a full line of devices ranging from **youth devices** and **ultra-lightweight full-carbon devices** to the latest iteration of the product that started the HNR revolution; the **HANS Sport III**. You won't find many differences between models of HANS devices other than construction materials (to save weight) and sizing, but HANS is still the leading purveyor of HNR in 2018.

Some of the most notable pros of these devices include their longevity and success in real-world racing applications and the fact that they've not needed to redesign the device much since the early days, which many will point to as a validation of their superior (patented) design. It's hard to argue with a history of success as long as theirs. In addition, the fact that there's now a HANS device for practically any budget is a huge selling point for a company that still owns a large portion of market share.

For drivers racing in a series that requires an FIA-Certified HNR, HANS is the only brand carried by CompetitionMotorsport.com that offers this certification presently (youth sizes not included). The Hybrid is also available with an FIA Certification but we do not have enough experience with these products and will therefore omit them from this Tech Talk.

Here are some common issues that have been raised over the years: First, you may need a HANS for each type of driving you do. That's to say that if you're sitting upright in a drag race car you need a 10 degree layback device, standard layback in most road racing cars requires a 20 degree layback, and most formula style cars require a 30 degree layback due to the extreme recline in the driver's position. Not all devices are available in all laybacks, either. If you're strictly a road racer driving a Spec Miata or other similar closed wheel car, a HANS with a 20 degree layback is likely the only one you need to have. Using a HANS device with a 20 degree layback in a formula car will push the driver's head forward due to the "halo" extending from the collar of the device behind the driver's helmet.

Second, I've had some customers complain that the "winglets" on the side of the device don't feel wide enough to keep a 3" wide harness in place. According to the company, however, they have tested with both 2" and 3" harnesses and the device is proven effective with either. Given the seriousness of the injuries these devices are intended to curtail, it's safe to say that I accept their word on this without question.

The last criticism I've heard about the HANS device is that the yokes on the front can bruise your clavicles, particularly after extended use. As I have a slim build myself, I have experienced this first-hand after a long weekend of racing. But, given the protection the HANS device offers, it's a small sacrifice to make in order to race safely.

Next, we're going to talk about **Necksgen** HNR devices. The current crop of Necksgen devices includes the **REV** and the **REV 2 Lite**. There are two ways in which Necksgen has offered a departure from the standard HNR you're used to seeing; First, they offer a yokeless design that won't extend over your pectoral muscles, eliminating potential bruising of the clavicles. Second, each model of Necksgen device has a fixed-point tether mount at the front of the device. This fixed point is said to greatly reduce the amount of lateral (side-to-side) head movement in an angular impact (as nearly anyone who has had a "racing incident" will tell you, impacts are seldom head-on with no lateral element). And finally, the Necksgen HNR devices don't have the "halo" that extends upward from the back of the unit, allowing your helmet to be firmly against your racing seat when tightening your harness.

While both devices offer a forward fixed tether mount, only the **Rev 2 Lite** allows you to customize the length of that tether for optimum mobility and comfort while still offering the same lateral impact protection.

I could argue that, despite the many safety enhancements claimed, the most easily marketable part of Necksgen HNR devices is the fact that they work with any race car in any seat position. Since they offer a yokeless design being in a more reclined position won't affect the device's ability to stay put and perform when needed. A close second to this feature is the lightweight design of the product. Being that they are yokeless, have a low collar and the injection-molded material is both strong and light, the Necksgen HNR devices are incredibly lightweight in comparison to most other devices including those made of carbon fiber.

There's only one complaint I've heard in my years of selling these devices: it doesn't stay in place and "falls back" on your shoulders. While I'm not looking to ruffle any feathers here, I have to be honest and tell you that I've not only worn these devices, but I have also watched customers who strap themselves in while using this device in order to verify the claims, and what I found may surprise you.

Most drivers get into the car and roll over to grid to await their race. In that time on grid many don't have their gloves, helmet or HNR on, and most don't cinch their harness tight yet (I can't blame them, as a properly tightened harness isn't exactly comfortable to sit around in). I want to stress again that I have witnessed this first-hand. When the 5-minute mark is signaled, the driver puts on their equipment and prepares to race, but most drivers aren't cinching their harness properly! They've had them on loosely while sitting on grid and then they hurriedly put on their helmet and HNR, tighten their harness, and think they're ready to race. The reality is that most of us don't press our back and helmet ***firmly*** against our racing seat prior to cinching our harness. This creates a gap between your shoulders and seat and, yes, if your HNR is yokeless that gap may be wide enough to allow the device to migrate backward. I'm going to state this as simply as I can, because I don't think enough people in the industry are willing to do so: this is human error and ***not*** bad design. If you can be trusted to put on your safety equipment, you can be trusted to use it properly.

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Last but not least we're going to talk about the newest entry in the HNR field, the **Schroth SHR Flex**. In many ways the Schroth SHR Flex is an amalgamation of features from both the HANS and Necksgen devices. It has a fixed-point forward tether mount similar to Necksgen devices. It has a short collar and lacks the "halo" making it similar to the Necksgen while also having yokes which extend over your pectoral muscles similar to HANS devices. The most interesting feature is the that Schroth has used a flexible material which comprises the yokes. This not only increases comfort for the driver but, coupled with the short collar, means you only need one Schroth Flex SHR for any race car you climb in to.

If you're looking for a list of pros for the Schroth SHR Flex all you really need to do is read the pros of the Necksgen and HANS devices above since this device incorporates the best features of both of those devices.

There is only one chief complaint I've heard from customers since these devices came out; their weight in comparison to the Necksgen and the carbon HANS devices. While it's true that the flexible and padded yokes offer a solution for both comfort and placement, it's also true that they add some weight and (in theory) hem Schroth in a little bit; they can't design a new device which is made of carbon fiber for weight savings while also maintaining the flexibility of the yokes, which is key to the product's features.

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Thanks for reading! I hope you find this information useful in choosing your next HNR.

Sincerely,

Maelstrom @ CMS