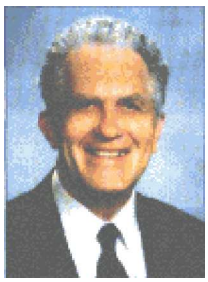
Motorcycle PRODUCT NEWS

Questions & Answers to Your Motorcycle Helmets

Claiming allegiance to neither specific manufacturers nor materials, the director of test development at the Snell Memorial Foundation shares procedures and answers critics.

Interview by Bob Jackson, *Motorcycle Product News* Magazine



The world of motorcycle helmets has changed drastically over the years, and today's headgear is the safest and most sophisticated in history. Much of the credit for that goes to the independent North Highlands, Calif.-based Snell Memorial Foundation, which periodically updates its testing procedures and holds motorcycle, automobile and bicycle manufacturers to high standards. Many of today's top helmets carry not only DOT approval - generally a given in the industry - but also the latest Snell certification, M-95. But because the dynamics of an accident are so unpredictable, all Snell officials say they can do is write a standard that will mitigate most accidents. This has led to a bevy of opponents, many who think the foundation is biased against polycarbonate and makes false recommendations to consumers. Motorcycle Product News' Bob Jackson sat down with Snell's Gib Brown, director of test development and the foundation's West Coast lab manager, to discuss the criticism. Additionally, Brown offered a history of Snell and detailed its testing procedures.

Motorcycle Product News: *How, when and why did the Snell Foundation begin?*

Brown: In August of 1956, Pete Snell was fatally injured in a sports car racing accident. Some members of the Sports Car Club of America wanted to somehow memorialize Pete because he was so well thought of. So five members of the club, including Pete's widow, founded the Snell Foundation, whose aim was to ensure suitable and improved head protection for motorsports participants. We care about the riding public, and we want riders to be able to choose the best head protection around without having to worry about it.

MPN: *How's the foundation funded?*

Brown: First, let me say that the Foundation has always felt strongly that it would not accept donations from individuals or companies with a financial interest in the production of safety helmets. But it does accept donations from clubs and private parties interested in furthering research in head protection. Donations of this sort account for about 10% of funding.

There are two other sources of funding: One is the fee paid by manufacturers to have their helmets tested. This takes care of the expenses and salaries of the test lab techs and equipment updates, but it does not pay for the rest of the overhead - things like administration, accounting and research. The other source is the sale of the stickers that go into Snell-approved helmets.

These stickers cost the manufacturers 40 cents per helmet, and this is what really pays for overhead and research.

MPN: *How many test sites does Snell use, and how many employees does it have?*

Brown: The Snell Foundation is in a transition phase. We had three test facilities: One in the United Kingdom, one in St. James, N.Y. - our main headquarters - and one in California. We've closed the St. James facility and combined it with our California lab, which is just north of Sacramento. We did that because it became so difficult to do business across the country. Only four of the people chose to relocate from New York, so we have a total of nine people working here in the United States There are three people who are salaried in the United Kingdom.

MPN: *The Snell certification has been revised every five years. What is the significance of that time period?*

Brown: There is no significance. Since its inception, the Foundation has had a policy that when "state-of-the-art" allowed better head protection for the public, Snell would raise its standard and try to further improve the safety. It has just so happened over the last few standards that the range is five years.

MPN: *What were some of the significant changes in the Snell M-95 certification compared to the Snell M-90?*

Brown: It turns out that there wasn't any real change in the ability of manufacturers to make helmets that would manage more accident-energy. But we did have a requirement for a "roll-off" test, which is necessary if the manufacturer wants to sell its helmets in European Common Market countries. We changed the "visual field" requirements for helmets to standardize the viewport, and we also went to an "iso" head form, rather than the DOT head form. This changes the test characteristics for helmets, so the manufacturers had to make some adjustments for that. It's a head form more consistent with the shape of the human head. And in the racing area, we did a more sophisticated flame test.

MPN: *What's the roll-off test?*

Brown: We put a helmet on a head form affixed at a 45-degree angle. We put a hook, which is attached to a weight, over the helmet and raise the weight to a given height. We then drop the weight to see in the helmet rolls off the head form. It's critically important that we're confident a properly fastened helmet will stay in place during the dynamics of an accident. We weren't assured of that before the roll-off test.

MPN: *What are the specific tests performed on a helmet forwarded for Snell certification?*

Brown: We do a retention test, which is a dynamic strength test. We do the roll-off test and a penetration test. Then we do the impact series, where we hit each helmet nine times, twice in each spot: Front and rear on each side, and once on top. On the double impacts, which are done against the hemispherical anvil (a simulated curb hit) and flat anvil (simulated impact with the ground), we do a 150-joule (measurement of energy) impact-energy and follow it up with a 110-joule impact-energy on the same spot. We have a laser system of alignment to make sure we hit the helmet on the same spot. We also do a chin-bar test. Then, we do a shield test where we shoot the shield with a pellet moving at 500 kilometers an hour to see if the pellet penetrates the shield.

It's also important to understand that we do our testing under conditions normally found in nature: hot, cold, wet and ambient. This means that we need five helmet samples: one for each of

the conditions, and one for archiving reference.

MPN: *Are those tests continually evolving, or have they remained similar since the testing's inception?*

Brown: They're always evolving. In the beginning, we realized that we could write a standard so perfect that no one could ever get hurt wearing a helmet that met the standard. But there wasn't a manufacturer in the world who could produce such a helmet. So we went out into the helmet industry and sampled all of the helmets available. We decided that the top 10 percent of the helmets were ones that could pass the Snell standard, and we revised downward. Then, as more and more manufacturers produced helmets that could pass the standard, we simply raised the standard.

Right now, most manufacturers can pass the Snell standard, but it's so difficult to pass that not all manufacturers construct their models to that specification.

MPN: *What has been one of the most significant Snell standard evolutions in recent years?*

Brown: Materials innovations: Kevlar, carbon fiber, expanded polypropylene and improved polystyrene. These have made helmets much lighter than they used to be while still retaining the ability to pass the Snell standard. So I'd say the evolution has been in the acceptance of space-age materials.

MPN: *How long does it take Snell to test a particular model?*

Brown: Actually, Snell does not test a particular helmet model. What Snell is concerned about is the shell and liner configuration. If a manufacturer makes, let's say, four sizes of helmets: small, medium, large and extra-large, but chooses to make the same shell and liner for the small and medium - with only a comfort-padding change -then we'd test the helmet in the two unique shell and liner configurations. Some manufacturers may have a different shell and liner for all four sizes, some only one. So it's the shell and liner that Snell is concerned with. The protective characteristic of the helmet has nothing to do with comfort-padding; it has to do with the shell spreading the load so that the liner can absorb the energy.

But with a given model size, after we condition the helmet for a minimum of four hours and a maximum of 24 hours, the test usually can be completed in five hours.

MPN: *What do you mean by "conditioning?"*

Brown: I indicated earlier that we test helmets hot, cold, wet and ambient - those are called conditions. We have a box that contains a water spray. We have a cold-temperature box and another hot-temperature one. We have to condition the helmets in those environments for a minimum of four hours. This would represent, for example, someone leaving their helmet in the trunk of a car on a hot day, and then putting it on to ride.

MPN: *What is the manufacturer's cost for performing the Snell tests?*

Brown: Snell charges $825 for testing each five-helmet set. Additionally, there's the 40-cents-each cost of the sticker that goes in each certified production helmet.

Once a manufacturer's helmet passes the test and the manufacturer pays us for conducting the test, that manufacturer enters into a licensing agreement with Snell. The agreement has two key parts. The first is that the manufacturer will put the Snell sticker in each helmet. The other is that

Snell will random-sample the manufacturers' helmets from the marketplace, which is what really makes Snell unique when compared to other standards. This way, Snell has a specific, concrete way of assuring that the excellence evidenced during the certification process is ongoing throughout the production cycle.

Snell buys helmets from distributors or stores for random testing. We prefer to buy from distributors because it's cheaper for the manufacturer. Snell back-bills the manufacturer for the helmets it purchases for random testing, and it also bills the manufacturer for the price of the test, which is $120 per helmet.

MPN: *Do many manufacturers not maintain the standard through the production cycle?*

Brown: Every manufacturer can slip once in awhile. When a helmet does fail a random test, it may not fail by much. But a failure is a failure. We immediately notify the manufacturer, send them the test results and, if they wish, the helmet. Then, we go out and buy three more of that company's helmets. We test those in the exact places we tested the original random-tested helmet. If those three helmets pass, the problem goes away. If one of those helmets fail, we enter into a serious discussion with the manufacturer. The manufacturers have always been very cooperative, and they recall Snell-stickered helmets that haven't maintained the standard.

In the few cases where manufacturers have refused to recall helmets, we've decertified the manufacturer and recalled the stickers, which means the manufacturer has to get the helmets back.

MPN: *Over the years, word has been that Snell has a materials bias, particularly against polycarbonate. Is that so, and what about polycarbonate does Snell have a problem with?*

Brown: In the early days, the polycarbonate industry was not mature, and there were some major problems with its use as a safety helmet. But that situation has changed, and there are a number of polycarbonate helmets on the market with Snell certification.

Back in the early days, you could take a polycarbonate helmet and put a solvent on it. You could put the helmet down and 20 minutes later hear a cracking. The helmet would split down the middle. That's no longer true. For many years now, polycarbonate has come into its own. Snell does not specify materials. It doesn't care what a helmet is made of.

MPN: *Critics of the Snell certification standard say that each subsequent standard seems to call for a more rigid construction, which they say may exacerbate neck and spinal injuries upon impact. What's Snell's stance?*

Brown: A recent study in the Northwest looked at several thousand motorcycle accidents that resulted in head and neck injuries. There was no difference between which accidents were associated with helmets and which ones weren't. If you're going to get a spinal injury, you're going to get it with or without a helmet.

MPN: *There have been various theories over the years that motorcyclists should purchase new helmets every three years or so. Has that been a marketing ploy, or do the materials used in motorcycle helmet construction fatigue over a period of time?*

Brown: I think "fatigue" is probably the wrong word to use. What happens is that many manufacturers use glues to put the liner into the shell. We've seen cases where the glues would degrade the liner. We've also seen liners degrade from perspiration and hair oils, and they become compacted through normal use. Snell finally looked at this and said there's no way we

can tell an individual how long his or her helmet will be good because the user is the only one who knows how a helmet has been treated. But as a general policy, because of normal degradation and improvements in the helmet, Snell recommends that helmets be replaced every five years.

MPN: *In addition to shell-rigidity and inner-liner protection, chin straps and their retention devices are another crucial element in the effectiveness of a safety helmet. How involved is the Snell Foundation in retention devices, and what does it recommend for the most effective retention system?*

Brown: Snell really doesn't care what type of retention system the manufacturer uses, as long as it passes the roll-off, dynamic strength and removability tests. We don't allow the hook-and-loop fasteners that accompany some retention systems because some riders may just attach that without fully fastening the chin strap.

MPN: *Given all of the elements of safety helmet construction, what would you say is the most important?*

Brown: This may sound funny, but Snell thinks it should be comfort and wearability. The reason for that is that nobody will wear a helmet they can't stand to have on their head. There is no Snell-certified helmet that stands head and shoulders above any other. They're all equal in terms of protection. The criteria, then, becomes comfort and fit.

MPN: *If there's a shortcoming in the general quality of helmets sent to Snell, what is it? What's the most common area of failure?*

Brown: Impact. What happens is that the hemispherical anvil and the flat anvil tests basically require different characteristics in the helmet. The flat-anvil test doesn't involve the shell much because the liner absorbs most of the energy. But the shell must be able to spread the energy load in the hemispherical anvil test. Otherwise, it won't pass the standard. So the routine problem helmet manufacturers have is making a helmet that successfully negotiates the tradeoff between the flat-anvil and hemi-anvil tests at these high-impact-energy levels.

MPN: *There has been considerable controversy about what effect drilling holes in the shell for such things as ventilation has in the possible weakening of the shell. Can this weaken the shell?*

Brown: It definitely can weaken the shell. It can actually destroy the characteristics of the shell. What Snell insists on is that when the manufacturer puts holes in the shell, we test the helmet again. If the manufacturer sends us a shell for certification, and then drills holes in it, we want to see it again.

MPN: *What's in store for the future of motorcycle safety helmets, in terms of technological improvements?*

Brown: I doubt seriously that the design of the helmets is going to get much better. But Snell foresees lighter shells. As a matter of fact, we have at least one manufacturer looking into helmets that don't utilize a hard shell - taking bicycle helmet technology just a little further. They're looking into making a super-light helmet with layers of foam, each with a different characteristic, so you don't need a shell. That may happen.

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