

# The Great **TRACTION** Dilemma

By Michel Garneau, in collaboration with Russ Alger

If someone were to approach you and attempt to sell you on a product that they claimed could greatly improve the safety of your everyday snowmobiling experience what would you say? What if they told you this device was particularly useful in those most dangerous of conditions such as icy corners and hills? Would you be interested? Well, if so, read on.



The product that holds this promise is known as a stud, or traction enhancement device, and has been with us for some time now. Together with carbide runners these items may hold the key to enhancing the safety of snowmobiling. For those of you who would like to know more about the various aspects relating to traction products, we will now attempt to provide you with an overview of the history, pros, cons, and issues that pertain to the decision to use, select, and install studs.

Any debate on the merits and use of studs should begin with a discussion on the legality of the product. It seems that many snowmobilers in the province are confused as to the legal status of studs. Well, fellow snowmobilers, to end the confusion, the body of law governing the use of snowmobiles in Quebec, an Act respecting off-highway vehicles, does not forbid the use of studs. Now, onto other issues...

As is the case with many motorized vehicle developments, studs and other snowmobile traction products trace their lineage back to the race track. Early snowmobile racers knew that they would be travelling on icy tracks at high rates of speed and wanted to do anything they could to help keep their sleds on the track. This resulted in the birth of a number of steering, traction, sliding, and braking enhancement devices. These migrated from the race track to your garage despite some bad press over the years.

It may have been an advertising gimmick by companies trying to market these products, or simply the fact that they originated in the racing world, but studs and, to a lesser degree, carbide runners were associated in the minds of many people with muscle sleds and riders that want to overemphasize speed and performance. Hence, the birth of the long running discussion about the necessity of traction and control devices on trails. The long-standing impression is that, thanks to studs and carbides, aggressive muscle sled riders are pushing the safety envelope on the very same trails you want to enjoy with your family. Although public perception has evolved somewhat in recent years thanks to a wealth of new research-derived information, to some degree the same concern exists today. Thankfully we can now benefit from this sizeable body of research that clearly demonstrates that traction products are veritable safety devices.

On the topic of research into the safety aspects of traction products, let us examine the work and statements of Russ Alger, Director of the Institute of Snow Research at Michigan Tech University in Houghton, Michigan, USA. Mr. Alger researches ways to enhance and predict the performance of vehicles in snow and on ice, including tests of ice cleats for large military vehicles, notably army tanks, all sorts of snowmobile testing, including traction and control devices, grooming research, snow removal studies and more. In doing so, he has performed and been involved in numerous tests on snowmobiles and how they perform in all sorts of configurations and conditions. It should also be noted that he has been an active snowmobiler since 1968. In sum, his curriculum vitae provides him with all of the necessary qualifications and experience to make him a credible authority in this specialized field of expertise.

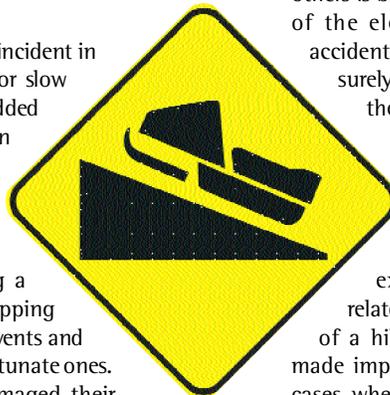
How, then, does an expert such as Mr. Alger perceive traction products? "Without getting into all of the boring details, tests performed, numbers measured and recorded, and miles ridden, it

suffices to say that under most riding conditions you should have both carbide runners and studs on your sled. The safety factors at issue are braking distance, sliding, turning, and side stability. It is true that braking on soft snow is not much, if at all, better with studs, but how many riders can say they will always operate on soft snow and don't need to worry about installing them. If you need to stop quickly on a hard-packed snow surface, not to mention ice, my bet goes with the studs. A properly studded sled will stop somewhere near 1/10 the distance of an un-studded sled. This means I will stop in 10 feet while it takes the other guy 100 ft!! Will I make the corner that suddenly becomes icy if I have carbides on my skis? The chances are MUCH better that I won't slide into that really big tree. Will the rear of my machine slide out going around that same corner if I'm studded? There's a MUCH better chance I'll keep it straight with the studs and the rider behind me will not hit me broadside."



The advantages provided by the use of traction products revolve mainly around vehicle control and ability to stop in slippery conditions. Traction balance is a key factor in maintaining control in adverse and icy conditions, and this can only be provided by traction products. The use of carbide runners as a means of ensuring and maintaining front end control is now commonplace and generally accepted by most snowmobilers; does it not stand to reason, then, that the factors cited for the use of carbides also apply to the rear of your sled? Logic would dictate so.

Most snowmobilers can likely recall an incident in which an attempt was made to stop or slow down quickly while riding an un-studded sled on a slippery surface. The result? In many, if not most instances an adrenaline-inducing ride in which the sled not only failed to stop in the required distance but also began to slide uncontrollably, often initiating a terrifying and unpredictable end-swapping situation. Those who can recall such events and walked away unscathed are truly the fortunate ones. Those whose luck ran out either damaged their snowmobile, injured themselves, or worse yet, are no longer around to recount their tale.



Some may argue that driving cautiously and according to conditions at all times makes the benefits provided by studs redundant. This line of reasoning, unfortunately, fails to take into account the often unpredictable appearance of ice on trails. Who among us has never been surprised by the sudden presence of ice on a trail? Furthermore, it should also be noted that slipping on an icy surface,

along with the potentially harmful consequences that may result, can occur at any speed, not only in instances of excessive speed. A pedestrian slip and fall accident would be a prime example of speed not being a prime contributing factor.

One often overlooked benefit is the fact that studs help to remedy dangerous road crossing problems. In one scenario, a stationary snowmobile's carbide runners dig into the pavement and prevent forward movement. In essence, the friction of the carbides on the paved surface overcomes the limited traction available from the un-studded track, resulting in the vehicle being unable to propel itself forward. Remember the earlier point about critical traction balance? On a studded vehicle, the additional "bite" provided by studs helps to overcome this potentially hazardous imbalance. In the other possible scenario, you find yourself approaching a road crossing in which the steep and icy embankments make it all but impossible to approach the road safely? On an un-studded snowmobile, you typically have to increase your momentum so as to scale the slippery slope and attempt to stop at the road's edge. This course of action leaves you facing potentially dangerous circumstances. In the first, you risk being unable to stop at the road's edge (due to the combination of excessive speed and lack of available traction). The potential consequences here are quite evident. In the other, you successfully manage to stop but you now risk being unable to take off (as described above). In either scenario your safety and those of others is being compromised and gambled. In light of the elevated and unfortunate number of accidents that occur annually at road crossings, surely traction products can only help to bring these numbers, and the very real human costs associated with them, down.

As our last example so clearly illustrated, studs can prove critical when climbing icy grades. Most experienced snowmobilers can surely relate at least one incident when the cresting of a hill on an un-studded snowmobile was made impossible due to the presence of ice. In cases where your forward movement is stopped mid-hill as a result of your lack of momentum (the only thing carrying you up the hill in the first place), you then find yourself on a rapidly descending large expensive toboggan travelling backwards and void of any ability to control or stop. In sum, a true recipe for disaster. An extension of this scene can involve the un-studded rider in front of you losing momentum due to the traction deficit and in turn starting to fall back, only to slide into the front of your sled? An easily avoidable situation with potentially dangerous and costly consequences.

From an economic perspective, the stability and control provided by studs also act as a kind of investment insurance. In other words, the hundreds of dollars spent on studs may help to protect your new multi-thousand dollar snowmobile from the damage incurred in a rollover or slide-induced accident. I clearly remember an incident in which a friend went to great lengths to explain how he, a self-avowed responsible and cautious trail rider, had no need for studs. A waste of money, he said. I also recall how it cost him \$1200 to repair his sled after he rolled it while crossing an ice patch (rendered invisible due to a light dusting of snow) on a lake. Somehow the three-hundred dollars he had saved on not purchasing studs became instantly irrelevant. Luckily he walked away with only minor scratches, although many are not always so fortunate.

The final, and arguably less important, benefit is the increased traction for acceleration purposes. I purposely said less important as this benefit, other than in competitive situations, is truly incidental for most responsible snowmobilers. On this issue, Mr Alger states: "On the performance issue, will my sled come out of the starting block faster? On snow, there is very little, if any difference. On ice, I will start faster, but for the safe rider, this will not matter."

In finishing the discussion on the benefits afforded by studs, what of the argument that asks: "Are these devices necessary for safety or are they really just designed to travel at unsafe high rates of speed?" In the real world there are some individuals who still dismiss the use of studs solely on the grounds that some irresponsible snowmobilers will misuse the benefit of improved acceleration in certain conditions. On this matter Mr. Alger states, "Does this make me go faster? No I don't think so. What about that "fake sense of security?" My opinion is that anyone who is pushing the envelope and needs studs to help them push it, should not be on the trail. This is the same as saying the tire companies should not be making better winter tires and car companies should move away from 4-wheel drives, traction control, anti-locks, and so on, to slow drivers down." To further this line of reasoning, ask yourself why you go to the expense of installing

winter tires on your car? Is it to accelerate more quickly on icy roads or to maintain control and improve your ability to stop in case of an emergency? In most cases I think the answer is obvious.

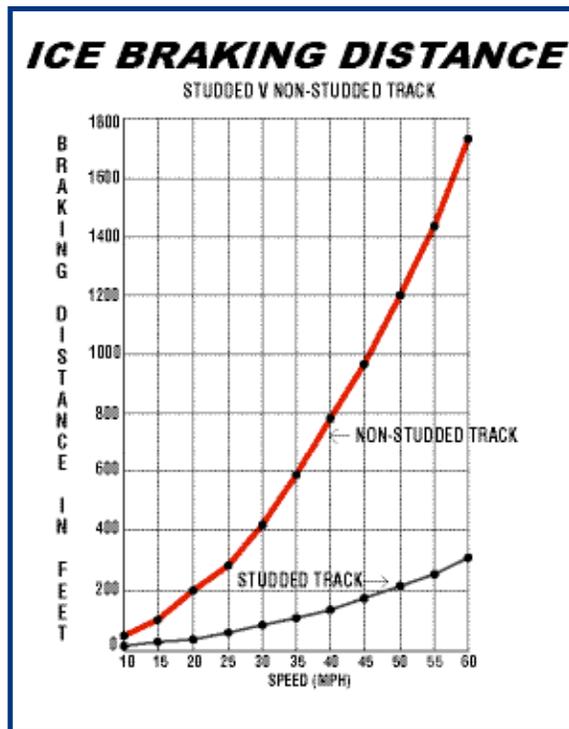
Well then, are studs merely victims of their racing ancestry? Apparently so. It would seem then that a double standard in questioning the safety aspects of studs and carbides is being promoted in certain circles. For comparison purposes, let us consider the example of disc brakes in our modern automobiles. Even though these were developed and evolved from the racing world, do we look upon these as limited scope speed-promoting devices? Or rather, do we consider them as safety

enhancements that save lives? Food for thought. I, for one, cannot recall any heated arguments or advocates calling for a return to four-wheel drum brakes on passenger cars.

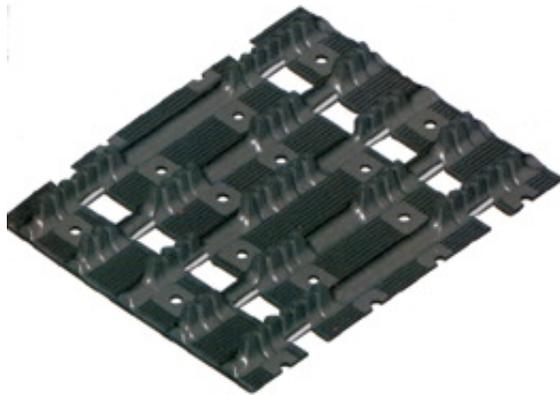
To sum it up, it seems that the safety benefits, particularly in icy conditions, of traction products are well established. Unless you ride exclusively off-trail and in deep snow, a sound argument can be made that studs can and will enhance the safety of your rides. In a world of warming winters and increased trail traffic, both factors that result in the ever-increasing existence of icy trail conditions, studs can be said to represent an economical and effective investment in safety. This is especially

true in late season riding, when even typically ice-free areas tend to develop slippery conditions. The daily melt and freeze cycle inevitably produces icy conditions, most notably in corners and on hills. In these areas, studs can truly be life savers. For those of you who remain unconvinced as to the merits of using studs, additional research conducted by renowned accident reconstruction expert Richard S. Hermance of Collision Research Ltd. (Analysis of the Effectiveness of Snowmobile Traction Products in Enhancement of Snowmobile Safety, Winter 96-97) further supports the findings and statements of Mr. Alger.

Now then, are studs the be-all and the end-all? Not necessarily. As in all things in life, studs have their pros and cons. Having dealt with the pros, we will now examine the other side of the equation.



To begin with, as Mr. Alger mentioned previously, studs provide little or no benefits in loose snow or slush. In these conditions, track lug height is much more of a determining factor for traction than studs. Onto financial matters, one must consider the initial expense of purchasing the studs, backers, and adequate chassis protectors. This will generally run into the hundreds of dollars. One must also look into the installation issue. Unless you do it yourself and are experienced in doing so, this can also represent an outlay of funds. The cost of replacing bent and damaged studs over time can also impact you financially. Realistically, however, this last item is not overly significant if quality products from a reputable manufacturer are selected and they are installed and used properly.



Other issues include the risk of track damage (unless you are using a pre-drilled track). This, however, is usually not a problem if proper installation procedures and techniques are used. Another related issue is the fact that installing studs will typically void the warranty on your track. Also, one must consider the danger of a ripped-through stud escaping while riding. This, however,

is much less common nowadays with the more widespread use of push-through studs as opposed to the older t-nut type.

Also, as in the case of carbide runners, studs can be damaging to surfaces such as roadways, garage floors, trailers, bridges and the like. However, common sense and a delicate throttle hand can all but eliminate these negative effects. It should be noted, however, that close inspection of many damaged surfaces reveals that carbide runners are often more at fault than studs. The reason for this is simple: while a delicate throttle hand results in studs gently "walking" across the surface, leaving little or no trace, the same cannot be said of carbide runners which, by their very nature, are "dragged" across and dig into the surface. Once again, studs are given a bad name thanks to a few irresponsible riders. For those who you who plan to or do use studs, please be considerate to the potential damage to road crossings, bridges, and other surfaces that can result from failing to act responsibly and exercise common sense. Your actions may have adverse political and economic fallout for your local club, or snowmobiling in general. What about harm to trails? Mr. Alger? "Do studded tracks tear up the snow on the groomed trail and make it bumpier faster? There is little if any evidence of this, and in fact, it is easily seen that paddle tracks are much harder on groomed trails."

Finally, for individuals who like to compete in radar runs or similar events where top speeds are important, the extra rotational weight of the studs may limit your top speed fractionally.

For those who have perhaps decided that studs are a viable option, or for those who simply wish to know more, we will now explore some of the more



hands-on aspects of studding. One such item is selection. This refers to choosing the proper type, number and length of studs, as well as the best studding pattern for any given application. In deciding which and how many studs to buy, always refer to the manufacturer's recommendations. Each and every traction product manufacturer provides useful and easy-to-use guidelines to assist you in making the right choices. Issues to be considered include type and size of sled, terrain, track lug height and riding style. You will also want to look into the matter of chassis protection for your sled so as to avoid expensive damage to your pride and joy. The manufacturer can also provide you with installation instructions and the necessary tools to use should you wish to do the job yourself.

What could happen if you fail to observe the manufacturer's recommendations? Well, you could possibly be faced with one of two scenarios: understudding or overstudding. Understudding refers to a condition in which an inadequate number of traction products are used for a given application. This typically leads to less than optimal results and potential track damage as a result of excessive load being applied to the insufficient number of studs. Damaged, bent, and ripped-through studs are often the unfortunate and potentially costly product of such a condition.

On the other hand, overstudding is also to be avoided. In this instance, the presence of an excessive number of studs results in the load being spread over too many penetration points. This, in turn, causes a "floating" effect which again reduces the effectiveness of the studs. To better visualize this point, think about a bed of nails. Finally, and evidently enough, it is more expensive to purchase a greater number of (unneeded) studs.

Going back to the issue of traction balance discussed previously, one must also remember that it is important to match the runners used to the number of studs in the track. A sled that has insufficient turning carbide for a given number of studs will develop a condition known as understeer. This is produced when the traction from the track overpowers the runners and makes the sled want to resist turning and continue to go straight, causing the front of the sled to "push" through turns.

The opposite condition, oversteer, is produced when the turning carbide overpowers the traction available at the rear of the snowmobile. This can be felt as a tendency for the rear of the sled to slide out in corners. By definition, oversteer exists to some degree on most if not all un-studded sleds as practically any carbide runner overpowers the traction of a bare track in most trail conditions. It should be noted at this time that the two conditions mentioned above may also be the result

of improper suspension settings. As such, a properly set suspension can help to alleviate the symptoms of these conditions but the root of the problem typically remains improper traction balance on the snowmobile and should be addressed accordingly.

Well folks, there you have it. Any last words Mr. Alger? "In closing, the issue of whether or not to use studs is, in my opinion, better answered on the safe and respectful rider theory. If we all follow the rules of safe speeds, safe riding habits, and being mindful of the potential for damage to our surroundings, we won't have any problems. These devices are undisputedly useful in the unforeseen situations where a little braking or steering assistance is in order. They are legitimate safety enhancement devices."

On a personal note, I am a firm believer in the use of studs and would not dream of riding my personal sled without them. My snowmobiling experiences over the years have led me to the conclusion that they are a sound and justifiable investment in safety. Like it or not, we all live by the law of averages; the longer and more miles we ride, the more likely we are to encounter situations in which traction products may come to our rescue. Remember, the best rides are those that you return from, unharmed and relaxed as only a long day in our winter wonderland can make you.

So, are studs for you? Only you can decide. Hopefully this brief overview will assist you to make an informed decision. Remember, however, that studs can only help to enhance the safety of your rides. Have a safe and enjoyable snowmobiling season.

