TECH TIPS — *Subject:* Slide Runner Wear
Model: All Models

The purpose of this information is to help understand and identify causes for unusual slide runner wear. We hope this information will be helpful to help educate your customers.

"What is a slide runner?"
Slide runners, or "Hyfax" as they are often called in the market, are the plastic components fitted to the rear suspension of the snowmobile's skidframe. This component runs directly against the clips on the drive track. They are meant to be easily replaceable and are considered a normal wear item.

"What's so special about this piece of plastic?"
Well, since you asked, lets first give you a little background on this component's design parameters.

Slide runners have a very difficult job to perform. They must have a very low coefficient of friction (remain slippery) while at the same time have a very high resistance to abrasion. They must also remain flexible enough to sustain impact without shattering over an extremely wide temperature range. Finally, they must be inexpensive so as not to "break the bank" when replacement is required. All snowmobiles currently being made use an extruded (UHMW) **U**ltra **H**igh **M**olecular **W**eight polymer plastic slide runner.

This type of plastic will stay consistent in terms of shape, friction characteristics, and abrasion resistance from -50° to 180°F. Between 180°~212°F, this material will gradually begin to lose some of the above characteristics as the temperature increases, but still has not gotten hot enough to truly fail. From 212°~267°F, failure of the slide runner will occur in the form of distortion and/or transfer of material onto the track clips. 267°F is described as the "crystalline melting point" in engineering terms. This is the point where the plastic would simply flow into a molten consistency. As you can see, heat is the main enemy to this material. The greater the pressure between the sliding surfaces of the slide runners and the track clips, the greater the heat.

Three factors work to reduce the heat:

1) The ability of the slide runner frame to draw heat away from the plastic runner's sliding surface.
2) The ability of the track to dissipate heat from the track clip.
3) The amount of lubrication between the two surfaces.

"They don't make 'em like they used to! Why, in the 'old days' my 'Hyfax' would last forever!"
From the beginning of skid frame rear suspension designs over 20 years ago, nearly all have used an extruded UHMW polymer plastic slide runner. All current snowmobile manufacturers use this same material today. Through the year's, all the manufacturers have tried many variations of this material in the quest for better wear and performance characteristics. All have returned to the same time tested material. In fact, all three of the OEM vendors that supply slide runners use the same resin to make their products! Additionally, all of larger aftermarket companies and most of the smaller use one of these vendors mentioned above to supply the non-OEM accessory slide runners!

"Well if the plastic hasn't changed, what has changed?"
There are several differences with today's snowmobiles as a whole that affect slide runner wear:

- *Track lug height:*
  Today's snowmobiles have significantly taller lugs than older sleds. In the past ten years alone, the average OE fitted track lug height has grown 200%! The height of the track lug directly affects how much lubrication the slide runner receives.
  Taller lugs = more distance from the snow surface = less lubrication getting into the sliding surfaces.

- *Unit weight:*
  Today's snowmobile weighs anywhere from 25% to 50% more than the older sleds.
  Higher unit weight = higher pressure on the sliding surface = more heat = higher lubrication requirement.

- *Track weight:*
  Today's snowmobile has a far higher top speed than those of yesteryear. Higher top speeds require the track to be more heavily constructed to withstand sustained top speed runs. The taller lug profile discussed earlier also play a key role in escalating the weight of today's tracks. The heavier tracks don't dissipate heat as well as lighter tracks. They also transmit higher forces on the slide runner at the track's re-entry point at the front of the rail.
  Higher track weight = increased force & track heat = higher lubrication requirement.

- *Higher average speeds:*
  The average trail speeds have increased significantly over the years due to advances in suspension designs and improved grooming on many of the trail systems. Higher speeds mean two things: more heat build up in the track and greater force on the slide runner at the track's re-entry point at the front of the rail regardless of the track weight!
  Higher average speeds = increased force & track heat = higher lubrication requirement.

- *Long travel rear suspension systems:*
  Today's long travel rear suspensions create more heat in the track due to additional flexing that is produced. Even at the same trail speeds, a long travel suspension will cause the track to run at a higher temperature when compared to a shorter travel suspension.
  Long travel = higher track heat = higher lubrication requirement.

- *Increased power output:*
  The higher horsepower levels of modern snowmobiles works the track harder than ever before. This means even more strain on the track. This intern causes more flex, which translates into higher track temperatures.
  Higher power output = higher track heat = higher lubrication requirement.

"So, why are there such drastic differences in the slide runner wear from one brand to another?"
There are often many different goals that today's sleds are designed to achieve. The differences in today's design philosophies vary greatly from one manufacturer to the next. This almost always means an attribute in one area and a compromise in another. For example: To attain excellent weight transfer and retain good comfort levels, the pressure on the front portion of the slide rail must remain high while the rear may be softened. This means a greater lubrication requirement for the front of the wear runner. Other factors, such as rail shape, track design, etc., all affect this area. Now, if that same unit must also have a high top speed, then additional idler wheels are generally not used. Any snowmobile engineer will tell you that the fastest skid frame uses the fewest wheels. That's because the fewer times you distort the track, the faster it will go. And anytime it must run under an idler wheel, it distorts. Obviously, this would make this particular brand more sensitive to lubrication than another brand.

"Then how come my buddy's sled doesn't wear out slide runner's like mine does? And he has the same year, make & model as I ride!"
Well, let's see. Were you both on the same trail at the same time? I ask about the time because in the sub-zero temperatures of early morning or the dead of night, a packed trail offers little if any lubrication. Whereas as the ambient temperature rises as the day goes on, the snow loosens to make far more lubrication available. Were you both riding on the same part of the trail or was one of you riding in the middle and one close to the edge? Do you both weigh the same with all your gear on? Are your riding styles identical? Do you each carry identical weight cargo in the same place on your machines? Are the suspension settings the same between the two units? Has spring sag affected one unit more than the other due to a mileage or usage pattern difference? Is the track adjustment identical between the two units? Are either of the units equipped with aftermarket accessories on the engine or clutches to increase performance. Something as subtle as the type of carbide and front ski toe-out adjustment can affect slide runner wear. Because they affect how much snow may be sprayed into the track area while underway. Are either of the units fitted with traction products on the track? If so, are they identical in pattern, type and weight? All of these areas can affect how much force is exerted on the sliding surface of the runner which intern changes the lubrication requirement. As you can see, there are many things to consider when trying to answer this question. These are just a few things that might be different between your two units. There could be many others.

"So what's all this talk about 'lubrication?' Why don't you just say snow?"
Well that's because snow, in itself does not provide lubrication. Granted, in the process of turning from snow into water, it does reduce temperature. But only after the snow turns to water does it lubricate, reduce friction, and eliminate the build up of heat in the first place. Think about it; a snowball in the face will often leave a brush burn. A shot of water in the face seldom will! And since you brought it up, there are many, many different types of snow. The size and temperature of the snowflakes themselves relate directly to how much lubrication they provide. The colder and finer the snow is, the less lubricating qualities it has. In extremely cold temperatures, it is possible to experience slide runner wear even when you think you have enough snow.

Other areas where high rates of slide runner wear occur are frozen, "windswept" lakes combined with high speeds. Because there is little lubrication available, runs in these conditions can lead to significant wear in a few seconds! "When the track clips turn blue; the runners turns to goo!"

And let's not forget about those early or late season rides before a hard "base" has had a chance to form. This often leads to a trail condition where the snow has a significant amount of dirt or sand churned into it. This will embed material in the face of the slide runner. The embedded material then increases the coefficient of friction drastically, which super heats the track clip and slid runner. Obviously, this also leads to premature slide runner failure and often can severely damage track clips as well. "The darker the trail; the faster to fail!"

"You mentioned traction products before, how much effect will they have on slide runner wear?"
They can generally increase the lubrication requirement because of the addition strain or flex on the track, which leads to higher track heat. Additionally, the added weight causes more force to be exerted on the front of the rail at the tracks "re-entry" point. Also remember that this added weight and subsequent force increases exponentially as the track speed increases. On the up side, more loose snow is kicked up by the traction products themselves and therefore can be available as lubrication. This varies greatly based on the type, condition, and pattern of the traction products themselves in combination with the snow surface.

"What about these aftermarket "high performance" slide runners? Why not use those?"
Everything is a compromise between the coefficient of friction and abrasion resistance. The manufacturers learned long ago what has the best balance in these two key areas. For example: they learned that if the abrasion resistance is increased too high, the coefficient of friction is sacrificed. In this case, the result is too often reduced track clip life. And track clips are much more expensive to replace than slide runners. On the other hand, "super slipper" slide runners often don't have the necessary resistance to abrasion to survive in all conditions. The phrase "all conditions" is the key to what the manufacturers are trying to target while always being mindful of the replacement cost. That is why they have continued to return to the slide runner material and configuration that is in wide use (as far an OEM fitment) by everyone today. That's not to say that your particular application of some aftermarket product will not see some benefit for your particular usage in a specific condition. But, generally, some compromise will surface somewhere else in terms of performance, reliability, or cost.