

## Tom's Musings — Dealing with Dirt

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“Usually . . . water in a cloud does freeze around 32 F / 0 C because of the work of nucleators, tiny bits of naturally-occurring material that help water molecules coalesce. The nucleators attract water molecules, which reduces their energy to the point that they form ice crystals. The nucleators in snow crystals are just dirt bits, bacteria and other material floating around in the atmosphere. Water condenses onto the nucleator, which becomes the nucleus -- the center -- of the snow crystal.”

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“. . . snow forms when water vapor condenses in cold enough temperatures, often around a nucleator, and becomes an ice crystal. So, the main things you need to manufacture snow are water and cool temperatures.

It helps the process along if you mix a nucleator of some sort into the water supply. The water will already contain lots of stuff that can act as nucleators, but increasing the count is a good idea because it ensures that more water droplets will freeze before they reach the ground.”

Excerpts from *How Snow Makers Work* by Tom Harris

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This past year's late winter skiing on man-made snow has brought forth many questions related to dirty ski bases and slow skis. To further support their inquiries, many skiers have shown me their grimy gloves after having swiped at man-made snow. Present no matter what time of year, when skiing on natural or manmade snow—but more obvious when the weather warms, creating a condensed snowpack through melt—is dirt. And the source? The nucleators explained above contribute greatly to this accumulation of contaminants in man-made snow.

In the case of man-made snow, fluorocarbon waxes typically work better than hydrocarbon waxes because of their ability to resist picking up dirt. More specifically, the molecules in fluorocarbon waxes have polarizing fluorine atoms, as opposed to the hydrogen atoms found in hydrocarbon waxes that keep those molecules non-polar. Similarly, the oxygen atoms found in H<sub>2</sub>O molecules, and most of the atoms found in dirt molecules are also polarizing. This results in a cleaner, faster ski when fluoro waxes are in use, due to the polar fluorocarbon molecules repelling the likewise polar water and dirt molecules in snow, reducing friction and enhancing glide.

Another consideration when skiing on man-made snow is the use of clear-based skis. A clear-based ski can help because the sintered polyethylene (without graphite) base material is, by itself, hydrophobic in addition to being harder and more resistant to abrasion (less potential

to create a rough surface to collect dirt). And the harder, higher molecular weight of the ski base adds to the skis ability to handle higher iron temps used to apply fluoro waxes.

— Tom Novak, Head Stonegrinder at Finn Sisu