Episode 8: Zach Caldwell waxes poetic on ski waxing (auto transcript)

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Unofficial transcript

Host 0:03

Oh, what time is it? woke me up. Hello everyone, I am your host fast big dog. And as promised in the last episode in which we discussed ski selection at great length, which with a wax tech to the stars Mr. Zack Caldwell, the owner proprietor of Caldwell sport. We're back with episode number two of three, in which we'll be discussing everyone's favorite topic, waxing. And just as a reminder for episode number three, we're turning the controls over to you the listeners, as the third episode will be exclusively questions from the audience. So if you've not already done so, please send your questions into either info at Nordic insights with an S dot news. Or slide into my DMs on Instagram at fast underscore big dawg. And thank you to everyone who has already submitted material. Every question I'm just telling Zack before we came on the air here, every question that we received thus far has been excellent. So Great work everyone and keep them coming. Okay, so Zach's background in skiing and family history and skiing is quite impressive. So if you've not already done so I strongly recommend you go back to last week's episode. And listen to the introduction there about Zach's lengthy and impressive involvement in the sport and the family history. It's interesting stuff. You'd like that sort of thing. And we've got a lot to cover today. So in the interest of time, and since that topic has already been discussed, and I think great and appropriate detail. We're just going to jump right into today's topic of waxing. So, Zach, welcome back to the show.

Zach Caldwell 1:54

Thanks, John. Great to be here.

Host 1:55

Great to have you. Okay, so without further ado, let's dive right in. So let me sort of you can approach this topic a number of different ways. And just to be clear from the very beginning, we're not going to start a talk about any specific products, because that is a rabbit hole from which we will never extract ourselves. So let's start at the very beginning. Because that's a very good place to start. You know that reference neck? No. Sound of Music baby.

Zach Caldwell 2:27

Extra Credit hounded me. Yeah,

Host 2:28

it really is.

Zach Caldwell 2:31

Okay, yeah. I might have seen that once. It's not it's not it's not on the list of movies that I rewatch, which is a shortlist. It's pretty much only the fifth element.

Host 2:40

Okay, that's fair. I like to keep you on your toes. So if you listen to the last podcast and talk to yourself, self, you know what, Caldwell and FBD are right? I do need some new skis. So you came home with a bouncing baby new pair of skis. And what I'd like to do today is have Mr. Caldwell take us through step by step and we're gonna go through the whole process. And this is applicable to existing skis as well. But we are going to start with new skis because they're, I think some Well, I know there's quest, I just got some new skis and I've got a whole procedure, and everyone kind of has their own protocol. So I think hearing from an expert, and someone who's been through this literally, probably hundreds of 1000s of times the correct breaking protocol, let's call it for lack of a better word. So Zack, can you take us through from the very beginning, you bring home a new pair of skis, people talk about hotboxing, you know, retailers talk about that. You hear people talk about having to lay down a bunch of layers that the new skis have a chance to absorb a lot of wax, you can tell us as if you know if that's a thing. So I'd like to hear. So obviously, this is applicable for both skate

and classic in terms of glide. Let's talk about how you prepare new skis. From the day you bring them home. And so this is like five questions at once. But including whether you would go and get them ground with a special grind, or kind of following up on what we talked about last week, or if you're going to run Factory grinds.

Zach Caldwell 4:21

Okay, great question. We'll we'll start at the beginning with the grinding well, maybe we'll back up a step from there and just talk about the production process and what all the companies have really pushed hard in the last 10 to 20 years to in the time that I've been actively visiting factories to really upgrade and change and improve. First is the production consistency has gotten so much better. So when I'm selecting skis compared to 20 years ago, I'm not nearly as concerned with trying to really rule out bad skis or find well matched pairs I'm much more concerned with Trying to find this key characteristics we're looking for. And it means I get to do my job, which is add human value, rather than do the factory's job, which is provide quality control. The other major piece of investment that's happened in recent times is investment in finishing lines, every factory is doing a much better job finishing their skis in the last, oh, yeah, 10 years or so some of this is ongoing. But factory finishes used to be a joke, they used to be quite bad, they used to be bad in two ways. One is that the skis were passed over a limited number of stones and the finishing line, the work that had to be done by each stone was very high, so the drive pressures were high, and the coolant or water that gets circulated through the system, which carries soluble oil for lubrication, wasn't sufficiently chilled or sometimes wasn't chilled at all, meaning that the whole system ran very hot. Now the problem we have is that the amorphous material and the base, the part of the base material that the wax can penetrate and go into has a glass transition temperature down around 10 degrees Celsius. So when it is warmer than that it is amorphous, like soft butter. Whereas when it's below 10 Celsius, it's crystal and more like refrigerated butter, meaning that the cleanliness of the grinding process really depends on keeping the whole system cold. All the factories have invested in better chilling and, and better finishing lines, higher quality, stones, more stones and just doing a better job. So compared to any point in the past, factory produced top end skis are better than they've been. Now that addresses the quality of the grind, which is still not as good as hand produced work. But it's good, it's good enough in many cases to be very competitive. The biggest issue we have here in North America is that our snow is very different from Europe, where the patterns that grind structures, the texture that they put onto the base is geared toward a range of European

conditions. And typically those grinds are more aggressive than we want. So if we take the example of Fisher's universal plus grind, which is called a P five one, the pattern is used on the vast majority of their production skis. But it's also used extensively on the World Cup when it's handmade by their race team on different you know, different machines hand produce structure, but same pattern. That grind is a quite universal grind in Europe, but it's quite a wet grind here. So if you get a universal cold classic ski, with a P five, one, you're operating immediately with too much structure on the ski. And this is true almost everywhere we look in the industry, different companies putting on specific grinds for the target conditions often don't hit the grinds that get the best performance out of the skis in North America. So if you're one of those racers that wants your skis to perform at the highest level, let's say you've just spent 800 859 $125 for a pair of Fisher helium 's or you know something in that range. The price of an add on structure to target conditions in North America is relatively low and very well worth it. So yeah, if you're looking for great performance, then yes, getting your skis ground for your conditions with structures proven in your area is a very, very good idea. Does that answer the grind question well enough? Yes, it does. Okay,

Host 8:46

actually, so I'm sorry. Let me jump in. I want a question here. So when you talked about chilling in the factory, because I also had an opportunity to visit a couple of factories, they're only the grind facility or the grind the area is what they have to keep chilled. They don't have to it's not like it's the

Zach Caldwell 9:02

water that circulates through the the the grind machines and keeps the stones cold and lubricates the system. If you put a ski on a grindstone with no water on the grindstone. It will absolutely destroy the ski in no time at all. So yeah, it's a it's a water cooled and lubricated system, there's a lubricant in the water itself that water is recirculated. It has to be filtered to so it stays clean, and it has to be chilled. And when you're running in a factory environment, particularly in mid Europe and the middle of summer, when it's really really hot, you have to have a lot of cooling power. And you have to figure out how to get the heat out of that system and move it away. And that's a major, major investment that's been brought to bear on production. In the time that I've been visiting these factories, they've been really really upgraded. The amount of energy they're putting into controlling that and the grinds are much better. And then some companies go

west that further. So say Solomon, for example, it during the pandemic, they had a really a limit to the skis that they were able to get produced Solomon Nordik is sort of a customer inside their own factory is the armor factory, it produces keys for Atomic and Solomon and also for other clients, and Nordic has to book production inside that facility. And they were unable to get as many skis as they had a market for. And they made the decision to bring all the finishing into the race department. So in the factory finishing line, they were just having the skis flattened, and then they had their race service technicians hand finish all the skis with Worldcup grinds, which is amazing. I mean, by far the best finish that you can get on production ski. On the other hand, they're not awesome North American structures, once again, you know, their G one structure that they're putting on their cold skis. You know, the ski skis is a fantastic structure throughout most of Europe, and it has great days in North America, but as a universal cold structure. It just has too many misses. So you know, we ended up taking it off the skis for our customers.

Host 11:14

Okay, that's great. Yep. So I think the the clientele the the person, probably, who was willing to sit through two and a half hours of this last time, and God knows how long this one's going to be. They're probably buying new skis for racing or high performance and that those two aren't necessarily mutually exclusive. I mean, some there's plenty of people who like just having fast keys. So and there's nothing wrong with that. So we sell a ton of them, right. So it sounds like a good idea to get a custom grind. By the way, I'm not sure if you heard Andy Newell had a name check to me the other day talking about comparing structures. And he said that you were one of the guys to see. So I don't know if the word got back to you on that. But it's always nice to see independent I mean, Newell has been around forever knows a lot about skis. So it's interesting to hear him kind of coming. coming at this with this. Gotta

Zach Caldwell 12:05

remember to cut him another kickback. Right,

Host 12:07

right. All right, so you brought the skis home, you got the sweet you know grind from whoever I don't know if you guys do grinds up there called Wall sports or not, but you got your sweet race grind. It's appropriate your for your conditions. Now what do I mean? I don't even want to tell you the breaking protocol, the by the US wax texts for biathlon a couple of years back these. One of them was German great guys, but they were like all Yeah, Johan, you must do this. I don't even want to tell you. I've got like just 50 Steps break in process. I mean, seems to work. Seems like I've got good skis a lot. But I'd like to hear from your perspective. You got the grind on him. Now? What do I need to hotbox them? How many layers do I need to put down? And you can tell me if it's different for cold skis, warm skis. But tell me what to do I pull them out of the box. Now what?

Zach Caldwell 13:04

That's a great question. As normal, I'm going to attack it from inside out and try to talk about what we're actually accomplishing. And I'll preface it by saying I favor simplicity, I like to eliminate steps that I find unnecessary. And get down to the simplest process we can come up with that gets you where you want to go with the least amount of work because it's a hard sport. And the more time we spend relaxing our skis, the more energy we're wasting on behalf of recovery and training and everything else. And so yeah, we want to hit the target, but we want to do it in a small number of steps. Now, the smallest number of steps you can possibly use is none. No vaccine. Right. All right. This has been this has been proposed. There was a guy named Leonid Koosman a while back that that basically, he's a crazy. He's in Sweden, I believe. And he's Russian guy who really he wrote some, some dissertation for a school that read like a sixth grade, like research paper. I mean, the level of writing was abysmally low. And his whole premise was that waxing and even stone grinding are a fallacy and this the whole industry is trying to pull one over on you. And you don't need to do it. You just need to metal scrape your skis. And that makes them as fast as they can possibly be. And this was literally I had Leonard Zinn who is relatively well known in the cycling world as a tech nerd, but he's also a big time skier. He contacted me to ask me about this and and I, I offered to send him a pair of skis that had been prepared with grinding and then I happened to be at the American Birkebeiner and I waxed them for him that year, as well. And they were faster than the metal scrape skis that he was testing over that season. So I just I just proposed He should test it out. And my my recollection is that it wasn't hard to be no waxing and no metal scraping, but more more temporarily and, and possibly really applicable. I've got a good friend, Claude Preca, who is the brains but not the brains. No, he is. He's the creative genius behind this old wax line from

Canada, a lot of people have heard of it, and many people are using it. And Claude has been working on it for quite a number of years, I met him when Amy and I were living up in Canada and, and he is a real true believer in everything he does, to the point where he can sometimes get blinders on and refuse to see other paths. But he really works hard to try to make things work. I sent him some test skis a few years ago, when he was living up in SilverStar. In the winter, and I, I ground them up. And when I talked to him a couple of weeks ago, he's living in Norway now. And he said, they've never seen an iron, he's only used his cola products, which are fully supplied products and liquids that are not wax based. And that he's just just continued to work with them there. And they went all the tests that they go in, and, and you don't need an iron. Now, because I respect the guy. And he's sent me some product to test. I've tried to replicate his results, and I haven't succeeded against my best practice. And I think this just speaks to the fact that every one succeeds at what they get good at, you know, you practice a process and you become good at it. And so I don't want anything I say to try, you know, to be intended to discredit your 60 Step recommendation. Us by Apple, I'm sure. I'm sure those guys know what they're doing. Right? All right, no, no question at all right. But I can tell you, I can tell you what I do and why. And that's the best I'm going to be able to do. So. First, we need to set the model, the base material is a two part material that is formed in a sintering process. So you have these little granules of ultra high molecular weight polyethylene. And they are mixed together with additive material, typically carbon blacking for a black base, and a bunch of proprietary stuff that even the ski companies don't know what's in and what percentage is. The base material companies are these polymer companies, they'll produce the material for the ski companies. But generally, they get samples, and then they test them. And then they have to get more samples to see if it can be reproduced. And they test them. And they're always trying to find something. But it's a little like us testing wax when we don't know what's inside it, we're just trying solutions and become customers of that wax. Well, that's, that's how the ski companies have to work to. So but but the commonality is that all of these base materials are sintered material, that are made by compressing these grains of ultra high molecular weight polyethylene in the presence of the additive material under very, very high pressure. And what comes out of the other side is a monolithic block that has grains of what we call crystallin, ultra high molecular weight polyethylene because at room temperature it is crystallin and state. And then these amorphous materials that contain squeezed out lower density polyethylene, and additive material in suspension, the carbon blacking and whatever else is in there. Now, the amorphous material is the magic of ski base material of high quality, high density, ski based material. And the reason it works, and the reason that we wax skis and use an iron is that

when you heat the base up to around 110 Celsius, the molecular structure of that amorphous material gets excited, it opens up, it physically expands. And wax that is present in a fluid state, at that point in time, will actually sink in and mix with that material. So there's not pores per se, there are no little tiny holes in the base, that are just down there waiting for the wax to sit in them. And and hold them. It's actually the molecular structure of the amorphous material. The wax goes into the mixture into that material. I used to say that it was a solution and I got corrected. It's not a chemical solution. It's two materials sharing the same space with enough chemical similarity, so they don't just get repelled. You couldn't do it with water it wouldn't mix. Right? So it's, you know, wax and polyethylene are chemically similar enough that in the right circumstances, when you iron wax into the base, it goes in. So this is what we're doing when we're waxing the ski and when we talk about saturating the base of a new ski, we're talking about allowing wax to go into the base, get that mixture of wax in the base and the base material. Why do we want to do this? Well, in my mind, there are a couple of things that this does. One is it keeps the base material how theory is like, it's like having a sponge in your kitchen sink. And just keeping it moist means that it's easy to work with, right? If it dries out, you got to go through a whole process to moisten it back up, and maybe you're just going to end up throwing it away, because it's a nasty old crusty sponge. So, or think about it, like the dashboard of your car, you know, if you just let it sit dry in the sun, it, it starts to crack. And so you keep Armor All on it or something. And it keeps us integrity, keeping the keeping wax in the base helps the base stay elastic and hard, it can get quite brittle. And that doesn't run fast on snow. Putting wax into the base also gives us the ability to modify the bulk property of the base material. When we put the base on the snow, it is a it's an elastic sort of plastic material that goes on the snow and has to glide. And the property of that material itself is really important. Not withstanding the level of lubrication that you have on the surface. So the bulk property of the base can be tuned with the wax that we put in, if we put a softer wax in, we're essentially softening the base, we can put additive material into the base like graphite, which helps with conductivity to discharge static, electric electricity buildup. Have you ever been classic skiing at night or even skate ski at night and really dry snow? And seeing the static discharge? Yes. It's cool, right? Really Yeah. But that's why you would that that that would be a good day to have a little graphite on the base, because it helps keep that potential energy from building up to the point where you get that Sparky discharge, and that's apparently not fast.

So at any rate, putting wax into the base serves a distinct purpose. So one of the first steps that we have when we're waxing brand new skis is to get them saturated, pick up get wax into the base, we tend to use a heat box. Heat heat box is a process as system where you put the wax in an enclosure, ours is a big closet almost the size of Asana, we can roll a rack with 120 pairs of skis into it, which is a big time saver. So we roll on a wax that's formulated to have the right fluidity at a very low temperature, typically 52 to 55 degrees Celsius. And the wax will over a long period of time, gradually saturate the base. Keep in mind that that amorphous material in the base needs to be brought up to around 110 to really open up and make for an immediate saturation. So in the heat box, you're using something kind of that I imagined to be more like osmosis, you're just putting that wax in a semi fluid state and letting it sink in and time but you can put a lot of wax into the base using that process. I did a series of experiments years and years ago using the heat box to see how much wax we could put into the base. And I found it was just linear with time, I became convinced that I could fill the wax the bass with wax or probably even fill the core of the ski with wax if I wanted to. But what I found was that in the process of ironing a soft paraffin into a brand new base, I could get about two tenths of a gram into the base in one ironing cycle. And then if I put a new application on, I could get maybe another two tenths of a gram over the next two ironing cycles. And then if I put another application on, I could get maybe another 1/10 of a gram over the next three ironing cycles. So in between five or six ironing cycles, I could get about 0.5 grams of wax into the base. And I'm figuring this out by just measuring us a clean, dry ski with a gram scale. But waxing it cleaning it really, really well getting everything off the surface, and then weighing it again. And just making a note of the change in this in the heat box. I could put it in for 12 hours and get seven tenths of a gram. I can leave it in for the weekend and get over a gram of wax into the ski, which is kind of mind blowing. When you do the math on how much thickness there is to a gram of wax just sitting on the surface of the skin. It's it's a lot, it would obscure the base completely. In fact, when we're using these new powder waxes, we're usually applying a total of about a gram of wax and scraping most of it away. So yeah, we use a heat box to get wax into the base. Now this begs the question, how much wax do you need in the base? Because one of the myths out there that I've heard, you know, perpetuated over many, many years is that you need to wax like crazy or really saturate the base. Right? Well, I don't think I don't think you need very much wax in the base. don't think there's really much gained by trying to fill the bass up with wax, you ski on the surface, the bulk property modification of the wax that's effective is typically coming from harder waxes with different additive content, not from the really soft paraffins, we would use in the heat box, or in those initial saturation steps. The way I think of it is that every time

we iron wax into the base, we're causing a layer of molten wax to mix with whatever was already in there, the model we're working with is that every time we iron a layer of wax, we're taking that material recreate, we're making it molten and fluid. And we're exciting that base material, so it opens up and that material then goes into the base and mixes with whatever was in there before. Now, if we're working with a really hard wax with a high melt point, that's only going to sink into the base for as long as it's fluid. And as it loses its heat, then it will stop moving. And so you either need a huge amount of time with iron, to get it deep into the base, or you're only going to have a pretty shallow layer. But if you have a softer wax in there, it's going to mix with that softer wax, and that softer wax will mix with it and draw it deeper in and anchor it into the base for more, more penetration, if you will. But of course, then you have agreed a gradient of wax in the base from this soft substrate of stuff that you saturated in the heat box, which is deep in there to a harder shell. And you'll have to keep in mind that as you add subsequent layers, you're always working that dilution. So why might you want to do four or five layers of really hard wax on a super cold day, so that you really get the hardness into the base, and you purify the signal of that hard wax in the base. Is that does that make sense? Does that model work for you?

Host 26:59

Absolutely.

Zach Caldwell 27:02

Okay, good. So here's the next part of initial base prep. And this is potentially controversial, but we've been doing it for years, and it really works. And this came up in a long time ago. And it really was triggered by a comment by this guy, Chris cable. He was a pair of Nordic athlete, a skier who skied for the US. He had a dual citizenship with Canada and ended up racing for Canada and got a gold medal in Sochi. Really, really intensely dedicated guy as serious as any athlete I've ever worked with, and was doing a lot of his own ski work. I was grinding skis, I helped him with some ski selection. And at one point he mentioned to me that like, yeah, the skis are great. I've always got to get a layer of like, green paraffin. And before they go fast, though. I think we're a little locked up again, shave. So I just want to make sure you got that. Did you get that part?

Host 28:01

Yeah, like I'm with to layer green paraffin.

Zach Caldwell 28:06

Yeah, so So what Clayville said was that, yeah, I need a layer of this hard wax in before the skis get good. Now, when I first started working with the US Ski Team back around 2000 2001, there were Swedish wax tax. And their standard was to use a yellow black setup, they would go oh, you alternate layers of Toko, yellow and Toko, black, the yellows are really soft penetrating wax, and the black is a really hard wax. And this works really well. I believe that what they were doing with the black was actually using a hard wax that carried heat very well, because that would make sense based on what Clayville meant, what Chris mentioned, but also, in my experience, you know, you have to get that layer of hard wax in and several years later, we're working with a polymer chemist in Boulder, who did a bunch of testing of this amorphous material in a colorimeter. And he found that glass transition temperature between crystallin and amorphous states at seven to 10 degrees Celsius. That was really interesting, because that told us about why we were chilling the grinding water and getting better results, but he also found a secondary glass transition up in the 130 to 150 range. Now, this is also the temperature range where we tend to quote unquote burn skis, those burns that we see are that amorphous material reaching this secondary glass transition temperature range, and essentially going through a level of transformation that is causing a chemical change in the base and hardening the surface. This is what we call race hardening. And this is the process that we develop based on this accumulation of information, information over time, is to take a wax this designed to carry heat on the We're of about 135 degrees. To do that, we need to have the iron at about 147 to 150. And we put that wax into the base, we use the wax as a vehicle for heat, and it's going in, and it is bringing that amorphous material up into the secondary glass transition phase and is burning the base on purpose. It's like searing a steak, same process as burning it, we're just doing it on purpose, because we know that that initial process of hardening the base chemically by bringing it up to temperature results in faster skis on snow in all conditions. The problem is that you can also damage the skis by doing this. And so you have to do it with a level of care and purposefulness, and use the right products in the right temperatures. So for me, the process of getting a new vergence key up to speed is first saturate in order to get wax deep enough to help anchor subsequent layers. Second, race hard, we want to bring the ski up, we want to sear it in that process that puts a shell on it. And then we start waxing with the

wax of the day. And at that point, we're not very many steps away from race ready and in fact, I have taken plenty of brand new skis at a World Cup level and put them directly into races and directly into the front of the pack. So 2011 World Championships in Oslo, I got some skis from Mazouz my friend Lars Svensson, who sold me my tessari Stone grinder had gained access to me at the mill slickers shop down at the Oslo soccer stadium. And we went down and we ground skis down there, and we brought him back. And we tested them for the 50k they became known as a skis in the 50k. And and in the first of their 16.7k laughs He was, you know, he had gone out on the main lap out to Frogner cetera and, and he coasted down into the stadium, knees in second place, and he's like shrugging your shoulders. He's like, I don't I don't know. I don't know what to do. That was a day after the skis were drowned. They'd been through the hardening process of basic saturation. I didn't even have a heat box. I did it by hand, just a few layers with the iron, hardened them. Race wax them, and they're at the front of the World Cup. World Championship field running great. So do you need to go jump in to town on the skis? Yeah, yeah, please. That's

Host 32:24

a perfect segue to my question, because this is great stuff. Ironically, that's not too dissimilar from what the German biathlon wax techs recommended. But just to kind of give everyone an overview here, you get the skis, you know, you get them from Pioneer. Get the get the aftermarket grind from you know, you leaps, you know, whomever. Who knows what they're doing? It's hot box, it's come back. At what point? Do what point in that process? Do I need to pick things up? Like, do I need to then race hard in them? Like what do I need to do? You know, as a serious racer, and moderately accomplished wax tech. So you know, if someone's listening to this, and they're like, You know what, I'm gonna do everything perfectly. I need it. I listened to the last podcast, I do need a new set of skis. They get them. Like I've got whatever medium grind, I want a cold grind. I send them to your on the phone, what the hell, let's say you send them to Caldwell Caldwell makes the grind, put to the grind in their hot box, they come back to me, what do I need to do? Let's let's just start with that question. What do I need to do when I get my skis back with my aftermarket grind? From someone who has hot hot box them?

Zach Caldwell 33:48

Well, it depends if they offer that hardening service. So we'll do that we'll do it as part of the full prep, including heat box, we we sell it as a service and we price it punitively because we need to disincentivize it it's a time consuming process. It's and to work with the iron one ski at a time. Right? All right. So if I'm looking if I'm doing it cheap, if someone's like, well, you're gonna save me an hour of an hour of work. Like why wouldn't I pay you $18 to do that. And then I've got three more days of work to clear the rack of 120 pairs of skis. So we charged 45 bucks a pair to do it. Because at least we're gonna get paid well for that rack of 120 pairs of skis if we're doing it. And so yeah, it's definitely an option to have it done. I've spoken at length with Jeremy Hecker, who runs the grinding operation for Matt at Pioneer. And he's, yeah, I'm confident that he's doing good work on that machine and is on top of the process. And I know they offer a similar hardening process. I've also heard of people testing, quote, unquote, race hardening and finding that it slowed the skis down against not doing it. So I've had people report back To me that also associated all with slows the ski down. Well, first of all, I'm going to point out one thing that since I started in the business, I have from time to time, coined terminology so that I could track the influence in the industry. So when someone says race hardening to me, they're saying words that I put together purposefully and started talking about, and I know that they're out there circulating. And therefore, I know that someone at least is listening to the process that I'm describing. I can't control what happens once it leaves the door. Another good one is residual camber, in classic skis, back in like 2004, when I was measuring classic skis, I came up with residual camber, and it's just descriptive. And it's not like I own the words, but I sure had never heard them before. And very quickly, you know, they get adopted into the lexicon. And so it's kind of interesting, as a way of sort of tracking the circulation of information to the extent that I can control that tracking. So if I hear about race hardening, I know someone's at least aware of a process that that I'm trying to do in a very controlled way without damaging skis. I've tested it many, many times. And it works very well the way I'm doing it. But once again, if someone else has a different process that consistently results in better results for them, then, and you're trying to get them to do your skis, let them do their process. How do I recommend this to someone who wants to do it on their own? Well, typically, I'm going to have that conversation. If someone doesn't want to pay me the 45 bucks first, I thank them. And then I say I can afford about five minutes of description to you, to brief you on how this should go. Because that's still faster than me doing it. So yeah, I'm very happy to describe it to people and even to sell them appropriate wax, we have some specific waxes that are formulated by a competent star, the company that we work most closely with for that purpose for us, and they're not formulated to be fast on snow, they're formulated to have great thermal stability for the hardening process.

Host 37:05

As usual, Mr. Caldwell, you are reading ahead. The first question that I've written down here is, I think we've done a good job talking about option one, you're all in on this, you buy your skis, you send them off to a professional to get the whole shebang done, they come back, all styled out and ready to go. But for the do it yourselfer, or someone who doesn't pay the money or whatever scenario you fall into, let's let's take that five minutes, because I think this is probably going to be a very common use case scenario. Someone gets a new pair of skis, they they're comfortable with the factory grind for whatever reason. Or like, you know, the steamboat team, we send them off, we get a whole bunch of grinds back in the summer. And I think a lot of kids are going to want to or need to get them race ready on their own. So what do I do if I am in category two here? If you could walk us through that? I'm sure everyone would love that.

Zach Caldwell 38:02

category was category two, what are you talking about? Oh, Category Two, where you're doing it yourself?

Host 38:06

Doing it myself? That's right. Dy

Zach Caldwell 38:08

baby. Yeah. Okay. So, yeah, okay, so I recommend three to five applications of a soft paraffin something that can be applied with an iron in the temperature range of 120 degrees Celsius, and has good fluidity in that range. Pretty much anything and then, you know, soft medium to warm range is going to be fine. Don't need a lot of additive content. At this point, we're not trying to make the skis fast, we're just trying to get wax into the base, I recommend ironing in a continuous slow paths with a ski that is at room temperature. So you put the wax on the ski, whether you drip it or crayon, it doesn't matter to me. But you're going to start at the tip and move to the tail or you're going to start at the kick zone and move out so that you don't end up with the iron stalled at the kick stone and accumulating heat. And you're gonna go on a continuous slow pass. And by slow pass, I'm

talking about maybe 20 seconds from tip to tail. Let's talk about the the thermal situation here you have 120 degrees and the iron in your hand, you have a ski that's more or less at room temperature plus whatever heat the wax that you just put on carried on to it. So a little extra heat but very, very little. You're going to take that 120 degree iron, and you're going to float it down the ski and you're going to move slowly and you're not going to worry about burning the ski and the reason you're not going to worry about damaging the ski is that the total amount of heat you can pull it in in one pass moving continuously is relatively low and you are using an iron temperature that is suitable for the wax that you're working with. And I can't overemphasize the importance of that every wax manufacturer publishes an iron temperature on the package. Many waxes have a relatively narrow range of thermal stability. And if your iron is set too high, or if it's a poor quality iron, and it cycles too high in his heating cycle, then you over energize the wax And when the wax goes into that amorphous material, it is vibrating so quickly that it damages the amorphous material. And that's when you start scrapping, scraping, Black Wax shavings away, and your skis turn white when you put them on the snow. And what you're seeing there is a amorphous material that has lost its integrity and as shedding carbon blacking into the wax and shedding little polyethylene fibrils onto the base, and it's a question of contrast, you see the carbon blocking and the clean wax shavings, and you see the polyethylene bits on the black back base material, but they're both they're all the times you want to avoid that. And that means you're using an iron a high quality iron set to the appropriate temperature for the wax. So you're not going to heat you're not going to hurt the bass because you haven't overheated the wax. The second thing you're not going to do is overheat the core of the ski, the skis are assembled with glue and laminates, the glue is thermally triggered and when we get it up above, somewhere around 100 degrees Celsius, it starts to soften and the ski can start to move. This is when you start to warp the skis or cause the bases to go out of flat. Some skis like mod Zeus or Rossignol are particularly more thermally sensitive than others. Others like Solomon, where they have the little screw holes drilled seem to take on heat and pick up little divots, fissures tend to go convex in the tips and tails, everything's got some level of characteristic deformation based on excess heat put through the base. So our objective is to have the heat isolated near the surface of the base. Because the iron is hot enough that if you spend too much time ironing, you're going to put damaging heat all the way through the base into the core of the ski. This is why one slow pass on a room temperature ski is not a risk, because you're never going to get that much heat. Even if your irons 155 degrees, a 22nd pass down the ski is not going to overheat the core of the ski. But if you immediately start another 22nd Pass, now the whole ski is warmed up that heat from the first pass

is spread out in the ski, and you have less thermal resistance, and you're going to start putting heat into the core very much more rapidly. So pass with the iron set the ski aside, let it cool close to room temperature, and then you can repeat. So I recommend a new ski or at any point in the life of the ski one year ironing wax to use that ironing method, typically three passes of the iron is sufficient to get the wax in about as far as you're going to get it. At which point you set the ski aside, let it cool for a good long time, you can scrape and brush. And if it's a brand new ski, I recommend doing that cycle of three heatings, three to five times to get the ski really well saturated, followed by utilizing a suitable high melt point wax like a Toko blue or a Swix. What used to be ch four, I can't keep up with our new system or like the star polar that we use. Those are those are fine, they have high enough stability at the temperature you need on the iron to raise harden the base. So all you're going to do is put that wax on, do your heat cycles allowing the ski to cool in between that is race hardening. But you're doing it carefully, purposefully and completely. With an iron set. This is run 47 to 150.

Host 43:36

This is awesome. So I'm going to repeat this just because we've covered a lot of ground here. And I think this is something that everybody has encountered in some way shape or form either new ski, skis reground, whatever. So you get the SKUs home. Roughly three passes. 20 seconds, but you want the skis to cool completely after each pass. So I make my pass rush.

Zach Caldwell 44:00

What's what's used the baby bottle tests like put your wrist on it. And if it's good for your infant, oh yeah, you don't have one if you're good for your dog.

Host 44:07

Yeah, there you go. Okay.

Zach Caldwell 44:12

Cool. You know, it doesn't have to be all the way to room temperature. But but as long as it's no longer hot, then it can take another iron past.

Host 44:19

Gotcha. So I do three cycles of that. Then I scrape brush, and then I repeat that three to five times with with the with the Toko yellow. Correct. Then I heart or whatever. Yeah, taco blue. And, okay, let's really nerd out since you know, that's what we do here. You want to really get in the weeds and tell us what what brush combos you're gonna use for both the the total yellow, you know, the absorption phase and then the race hardening.

Zach Caldwell 44:54

At this stage, it doesn't matter very much at all. In fact, here's a dirty secret when we're pulling skis out of the heat box. Alex, and we're going to raise harden them, we are scraping off the heat box wax, which is kind of dummy sticky stuff because it's got to have quite a low melt point and be fluid at a low temperature. So we scrape that off, we often don't even brush because it's so gummy and gross, and it just fills up all the tools. So we don't brush, we just do a really complete job scraping. And at this point, we're not taking we're not putting the skis on the snow, we're not putting on the grinder, it doesn't matter. If we get all the way back down to the base with a super thin film, we want to have the right dilution, we want to have enough of the hardening wax to carry the heat without losing stability. And we want it to go into the base. So as long as I've got the base really completely scraped with a good sharp scraper. So I'm looking at the structure, there's really nothing much left. I know I could gum, I know there's still soft wax on the surface. But for the purpose of prepping the ski early on, I'm happy to forego the brushing and the mess and stickiness. And just go straight into a hardening wax, as long as I have a sufficient volume of hardening wax to carry the heat. And that's just a pretty average application, we get the wax in powder form. So I use a little more than I would in a standard iron powder application. So maybe an hour, maybe I'm sorry, maybe 1.5 to two grams of wax on the base to carry heat in in the hardening process. After that, when we get into waxing for performance, then we can start talking more specifically about brushes.

Host 46:38

Okay, and how many cycles are you doing of the hardening phase.

Zach Caldwell 46:44

So typically one cycle is going to be sufficient to get a really uniform shall have hardened base material on the surface. That is race hardening, that's what we want to do, what we're doing there is we're making sure that the ski doesn't end up getting spot hardened, where you have areas of the base that are hardened, and areas that aren't those areas that are hardened actually go through a volumetric change, they stand up off the base just a little bit. So let's say you have a mid range wax like a cold, not a polar, you know, like, oh, Swick six or something like that. And you have your iron at 140 Celsius, instead of 147 to 150. With that really cold Hi, Mel point wax, that that that cold wax is not polar doesn't carry as much heat, it doesn't contain as much heat. And the iron is going to cycle through a range of temperatures, where you might effectively harden at some temperatures, you might bring the bass into that temperature range. And in others, it's going to fall out of that temperature range and you're going to have uneven hardening. Otherwise, the other way you can really screw it up is by running the iron back and forth as though you're ironing clothes. And every time you stop the edges of the iron sink and come into contact and you get all these little bars of hardened base material. Because you haven't hardened to uniform shell on, you haven't done a continuous slow pass, you've continually stopped the iron, let it sink, let the heat accumulate at these turnaround areas, and you've got really uneven hardening. So having done a really good job of hardening the base means that you have a really uniform ly hard shell on the base that will protect you from damage and subsequent waxing with higher melt points is going to not accumulate as unevenness on the base. Does that make sense? Did I leave the question behind? Totally. No. I can't even remember what your first what the what question I was answering. I just I get going and I keep talking and the

Host 48:46

the question. I've noticed that Yeah, the question was, how many cycles? Do you do have the hardening

Zach Caldwell 48:55

phase? Okay, yeah, yeah, just just the one like, you know, those three heat cycles, but you don't need to scrape and brush and redo it, you've done it. By the time you've got the heat transferred to the base, you've done it until the next time you grind your skis. Okay, that is not the same thing as preparing the skis for really cold conditions where if it's ultra cold this weekend, I'm preparing skis to leave on Friday morning to go up to Lake Placid for the super tour and the temperature overnight Friday night should be minus five Fahrenheit. And for the high temperature during the day is going to be like you know, plus four. So really, really cold and a mix of manmade and natural snow that fell yesterday. So we're going to need to really, really work the skis and for that purpose, I'm going to iron in multiple layers of very cold wax in order to purify that signal and get that the bulk property of the base hardened off and even though applying I might be applying the same or very similar wax using the same iron temperature and the same technique. And the only thing that differentiates it is our target purpose here. I'm waxing for performance now. So I want to really get the wax in and we're using, we're targeting wax in the bass now instead of the thermal process in the bass.

Host 50:16

Yep, no, I'm with you. All right. I feel like we're close. We're almost almost through question number one. So this is good. Last thing on this is kick zone prep. So you've got the new skis, you got got yourself a nice new set of kickers, what do you like to do to get the kick zone properly prepared for a season of successful racing? Well,

Zach Caldwell 50:39

first I'd like to identify that's a process that I do with my hands and eyes and a lot lot lot of experience and I'm pretty good at it. I don't think I miss all that often. Kick stone is defined sort of by double camber. So it's got a secondary radius inside the, the radius of the glide zones. And so the best way to put it is that it's built into the ski and it's not nearly as variable with most models of modern skis, as people tend to think it's much less dependent on skier load, then people tend to think what is dependent on skier load and skier loading position is the volume of wax that can be carried, but the ends of the kegs are normally pretty well defined by the material and camber. So you first need to identify that I've seen lots of terrible terrible kegs on markings made by paper tests. And I've seen almost equally terrible markings made by flex testers. So if you're using a paper

test, or flex testers, you should then go out without doing any excessive preparation with just wax on unsanded base. And after some minutes of skiing, you should see where the wax is wearing. And and isolate the kick zone. If you want fast keys, you've got to isolate your kick zone inside what gets carried during your glide phase. So obviously, if it's abrasive conditions, you're going to scrub wax off the ski. But if it's not super abrasive, that kick zone, the structural kick zone that's that holds the wax clear of the snow, even though it's in contact, it's not under pressure, when you're double polling, or tucking, or striding in the glide phase, the the wax isn't going to be under pressure and it won't totally get scrubbed off the skis. But where you see a lot of wear from the snow at the front and back of the zone, you should cut it back to eliminate that otherwise you will be pushing wax during your glide zone egregiously. Right. So once you've identified it, yeah, once you've identified that kicks on, this might be a whole other podcast is identifying the kick zone, right. But once you've identified the kick zone, then you should sand it. And I just use 150 grit sandpaper, I wrap it around a cork, and I sand pretty quickly in the direction of the ski. I don't do any crazy Chevron's or back and forth sideways standings, you're breaking the surface of the ski, you're creating additional texture and surface area for your kick wax to bond to. You don't need to sand it like crazy. There's zero point you don't get better durability. Durability comes from a binder layer. So this is the next step. I'll take I'll sand it will take a binder I really like bowtie super bass in almost all conditions. Sometimes when it's fresh, often when it's fresh. No, we're on other binders, but for prepping skis early on the Super Bass goes into the ski pretty well with heat and spreads out and you can put on a very thin layer and now you've got bass wax in the ski and and you're you're kind of good to go and start. Start putting kick wax on.

Host 53:47

Okay, I just want to reiterate that point because this I think is a very important one because I've heard many, many times the exact opposite. So you'd like to stand parallel to the long axis of the ski, not the chevron pattern. Is that correct? Yeah.

Zach Caldwell 54:00

Yeah, the Chevron's idiotic, okay. Okay, what do you gain? There you go you gain you like at a very best, you're going to create an opportunity for mechanical friction. At worst, you're rounding the skeeled because you're getting more on the edges then you are in the middle. So for the sake of my grinding operation, when

you send the skis to get reground just go in line with a ski and back it up with a solid block or a cork, something that keeps it flat. And just like you're just putting texture into the base, the rest of it is going to be chemistry.

Host 54:32

Okay, the shampoos or anything else that okay, that's done it here first is Is there is there anything else that I missing? Or is there anything else that you would like to add in terms of how to get your brand new pair of skis race ready?

Zach Caldwell 54:55

So now we're in the floral free era, and I gave you the anecdote Have the half skis and the 2011 World Championships that were, you know, really good skis operate running toward the front of the master pack in the 50k, the day after we ground them. In the fluoro free era, we have growing evidence that repetition and cycles of iron paraffin and particularly natural paraffin, petroleum based paraffin is what we call natural paraffin versus synthetic paraffins, which are very long chain laboratory produced paraffins that are typically in the harder and colder waxes, the natural paraffins penetrate the skin more easily and they tend to leave a nice healthy shine on the base. And we have just growing evidence that continual cycles of this waxing with natural paraffin helps bring the skis up to speed and time. With floral material, we are able to get the skis race ready very, very rapidly. leaning heavily on the chemistry with floral free, we're working more with much more of an eye toward procedure, and we're doing things kind of more of the old way the way conventional wisdom dictated before Floros. Recall that in recent years in the fluoro area era, World Cup teams were starting to forego paraffin altogether and just burn fluorocarbon on the bare basis. They were destroying skis. I mean, it was really horrendous for the skis. But they they made fast skis, I mean, the floral chemistry was so important that just getting it on the ski kind of trumped so many other parts of the process. So you remove that. And now the way we're working with wax, we kind of got to go back to old school. And we have seen a lot of circumstances where repetitions of waxing with these natural paraffins can help stuff along the issue we have is that a lot of the natural paraffins are too soft for practical training. So Pat O'Brien actually asked me to to get a wax specific for the purpose of just continually servicing the skis like just a training and service wax that he could always be putting on skis in order to be kind of incrementally increasing the health and performance of that base making making it that shiny, glossy black lab coat style base, you know, that's the one

that that runs really fast and in many conditions and so yeah, we we had David and make this star wax that is it's a natural paraffin but it's quite hard. Not not as hard as cold wax but harder than the medium. So it's a good hardness for for training. And hey, we use a ton of that just to just to increase the health of the skis and time. It's not a question so much of heat cycles and putting the wax into the base. It seems to be just like a little like kneading bread, you know, you just make an incrementally better surface as you go through cycles of ironing, scraping brushing, I should also back up and say we're not talking about the same phenomenon that we used to see back in the early days of stone grinding, where all those cycles were smoothing the base out and dulling the structure that was usually egregiously terrible really ragged, super hairy, just bad bad structure. Instead, you know the modern structures are vast right out of the red right away. But something about that process seems to be making the bases faster.

Host 58:30

So let me ask you this is it therefore advantageous to you know you got your new set of race skis you know, you got them race ready either you did it yourself or you did through someone else? You know, a shop now I got them here in the garage. Do you want me to wax them scrape brush, you know, a couple cycles, you know, in between conference calls? Or do you want me to put on a layer paraffin scrape brush go out ski come back in repeat that process, I guess. So the question is, how important is it to skim in between each one of those application layers.

Zach Caldwell 59:09

I don't think it's critical, but the benefit of skiing them is you get to ski. And that's kind of the point, right? So so if you get into a pattern in early days of bringing skis up to speed of just of just waxing every time you go skiing, then you're great. Now let's, let's maybe leap ahead just a second. And I should say, with respect to just general care of the skis, keeping the bases healthy and getting the performance out of them. Once they've stabilized and they're up to speed. You don't need to wax. You don't need to hot wax and we don't need to iron wax every time. You could you know, iron wax application should last in the base for I don't know how in Colorado a couple 100 kilometers, maybe in the east where it's icy and crappy more like 100 But you know, you should go a good long time, right? You should be able to you should be able to use that for a while and with these modern liquid waxes that allow you to put For a surface film on that's going

to optimize your glide for the day. You can you can ski a whole week of training on one hot wax application, putting on liquid every day and have great skis. But in the early stages of trying to bring that ski up to optimal performance, if you have the time and patience to ski that week and wax, relax this, you know, clean, relax the skis every time, then you're doing the skis a favor as you bring them up to speed.

Host 1:00:28

Oh, Mr. Caldwell, you are reading ahead. Because a topic of fact, I was just at a, everyone was just kind of a bunch of people out skiing had a couple beers. Just last week, and the topic came up of the liquid paraffins versus hard wax and how often exactly what you just said, so I'm going to ask you to repeat that because I think it's a really, really important here. So we're talking again, I understand there's different levels of abrasiveness, but Colorado snow or any place, you know, a mountain west, a couple 100 K's off of hardwax correctly a bride correct correctly prepared ski. And you're putting liquid paraffin on this is again, you know, assuming non changing conditions, which has been it's been pretty consistent here. So let's talk about here because that's where I am right now. You're going to hardwax every let's just say every 100k and then liquid paraffin before every training session.

Zach Caldwell 1:01:31

Yeah, yeah, works great. It's awesome. I mean, honestly, that's what I'm skiing on most of the time.

Host 1:01:38

All right. Well, and this is a perfect segue to it, because you had in the last podcast, a great comment. That race skis like to be ski. I love that. So I think this is a good transition into sort of normal everyday training. We've already sort of tiptoed over there anyway. So we've got the skis, we got the right grind, we've got the right quiver, we've got them hot box, we've got them race hardened. Now I'm ready to go train. So, you know, assuming that it's not, there's not some type of crazy anomaly, which I know can happen, you know, out east or a variety of other places with highly unpredictable weather these days. So assuming that, you know, it's things are, you know, reasonable good to reasonable, reasonable to

good. And dovetailing on what we just talked about. You want everyone out there on the race skis, right? Oh, yeah. If possible, for sure. Okay. So just wanted to clarify that because we, okay, because there is a notion that race skis need to be kept in the vault and only brought out on race day, but you'd like for everything. We just talked about getting used to the ski ski testing, skiing the skis. And so I'm out there my race skis, walk me through you, you and I are getting ready to go out for rip tomorrow morning. Tell me, let's just say they haven't been waxed on while. Let's get really granular here. And you said we'd come back to this. So tell us what you're going to, you know, how many passes you can make with the iron? How many times are you going to how many passes you can make with the scraper. I know this might sound remedial to a guy like you who's used a really, really high level race prep on the World Cup, but we have a lot of so number one. There's a lot of conflicting opinions on this. So it's I think there's a lot of like the Whisper down the lane game. You heard it from someone who heard it from someone who missed a step who transposed another step. So again, my apologies for anyone who thinks this is too remedial, but I think it's probably very helpful for everyone. So the skis are ready to go. I've got the race skis. It's good, good, good, be good training day. They've reached the point in the cycle where they're ready for wax. Tell me not specifically the product, but it's a cold day. What do you put down how many layers tell me how you scrape walk me through soup to nuts what you're doing. If you're going to rotor brush, you're going to hand brush, tell me what brushes you're going to use. Take us through everything we need to know to get ready to go out and train like a pro.

Zach Caldwell 1:04:04

Okay, so first wax selection. There are a couple of different ways you can approach this. I have many customers who are recreational skiers and want like really good skis, but they don't need to be race ready skis. And a lot of them want to simplify the process as much as possible. So I might set them up with a wax package that's as simple as a good broad range, cold synthetic paraffin for cold conditions and a good broad range, Warm Natural paraffin for warmer conditions. Maybe a medium level one, you know not not super, super soft. And basically, we're just going to select one of those two waxes for that skier and have them put the put the wax on the ski as previously described, just iron it on. Want the ski to cool for a good long time. I think it's easy to try to hurry that process up and scrape and brush right away but if you can give the ski time To stabilize, you create a better boundary layer between the base with the wax in it and the wax itself. So, you know, ours is better than minutes and overnight is awesome. You can put it outside, that's fine. But part of the process is just the somehow the

crystallization process of paraffin is quite long tailed. And so giving, giving a decent amount of time is can result in better outcomes. Yes, you get a better boundary between the bass and the wax that you're taking off. So if you run them

Host 1:05:36

let me stop you right there. Because this is an important point. So you and I are training tomorrow morning that 10 o'clock. you're advocating, you know, I, it's steamboat. I know it's gonna be cold tomorrow morning. I I'm 100% sure what wax I'm going to use. There's no question marks there. You're advocating putting it on the night before putting on one pass and letting it sit overnight? Not squirt, scraping, not brushing, but just one pass with the iron or this is going back to a couple passes. Yeah, no,

Zach Caldwell 1:06:07

you can you can do that two or three pass cycle, allowing the ski to cool him. Okay.

Host 1:06:13

Okay, but don't scrape brush, you want it to sit there overnight to really let it soak in?

Zach Caldwell 1:06:18

Yeah, I would. Okay, and it's not so much that is soaking in the grass is going to solidify almost immediately. But what's going to happen is that the base is going to re stabilize, you're you're putting that wax with a lot of heat energy into a combination with a bass and and that whole thing has to reach an equilibrium. And it doesn't seem to happen that quickly.

Host 1:06:40

As soon as the words were leaving my mouth, I said to myself, he's gonna jump on that I knew you're not gonna like that expression. So good. But well point well

take it because this is this. I know, I know, the dogs are sitting here, there's like, you know, he's gonna kill you about that. I'm like, you know, I know you guys are right. And he did. But this is this is why we're doing this because this is the type of stuff that I am fortunate enough to have heard from you. Or watched you when I was staying at your house. And not a lot of people have this opportunity. So I think this is the type of stuff that's and it's odd. Honestly, a lot of times I do it out of sheer convenience, because you've got a little bit more time at night, maybe you're not sure what's going to be going on in the morning, you got to run out in between conference calls or whatever, it's really nice to be able to go down there, grab the pair you want out of the rack, scrape brush and rip out of the house instead of having to go through the whole thing. So I think this is a very, very valuable recommendation that you don't always hear. So please continue.

Zach Caldwell 1:07:39

Yeah, so it's morning. Now our wax has been on the ski all night. Everything is happy and ready to go. And now we're scraping I start by scraping the groove and the edges of the ski I use the end of the scraper to scrape the edge of the ski so that we don't dig up the cutting surface of the scraper. I like my scraper is very very sharp. The amount of wax you put on should leave it so that you're not dripping off of the sidewall so you got pretty quick work scraping the edges right it's just a quick 45 degree hit on the on that sidewall on the on the edge with the end of the scraper. If you've got wax dripping over the sidewall, you need to go to remedial waxing school you don't need five frisky All right, you just don't because you're going to take it all back off and you're leaving yourself a huge amount of work. You know, one to two grams of wax on this key is is really good. Yeah.

Host 1:08:32

Do you crayon or drip

Zach Caldwell 1:08:35

either doesn't matter makes no difference at all. Whatever you like a drip because it's fast and less messy, less, less, less waste drips all over the place. But if you're not good at dripping, then the crayon is way faster

Host 1:08:57

Are you holding the iron just above the surface of the ski or are you letting the corner of the iron the rest of the ski

Zach Caldwell 1:09:06

so the irons that I use are the star irons and they've got a a thermoplastic kind of shield above the hot plate that protrudes out just a little bit and you can hold the iron so that it rests on that piece of plastic, you're not actually resting the metal on the base. You're just resting that piece of plastic on the base, which doesn't damage the bass in any way. But when you then drip, you'll drip a single continuous bead all along the ski. And you it makes it super fast to spread with the iron. So you know one pass up from the tail up to the tip and you just turn the corner and come all the way back down and you're done. It's taken about three seconds max. And now you're up at the tip and you're ready for your 22nd pass and you're using the bevel tail of the iron just to spread the wax and bam you're done with your first pass 25 seconds After you started, you've got your first heat cycle and and if you pick up the other ski, put it on the bench and do the same thing. The first key has now had its 30 seconds to cool. And it's surprisingly close to ready for another pass with the iron. And so by the time you've cycled the skis back and forth a couple of times, now you're just ready to set him aside and let him cool. Okay.

Host 1:10:26

And we started talking, brushing, so they're gonna, yeah,

Zach Caldwell 1:10:32

scraping and brushing. Yep. Yeah, morning time now or whatever, however much time later that you're able to give the skis. Yeah, scrape and brush, start with the groove to the edges. And then a good sharp scraper, you should be taking really all the wax off with the scraper, you can scrape right down to the base, you can damage your base, if you can't hold the scraper, flat on it, and you dive off the edge. Like it literally it's like veering off, it's like you're going down the road in your car, and you spontaneously just crank the wheel to the right and veer off into the guardrail or something, and you're going to damage your car, right? Well, you

you don't do that when you're scraping, because you will damage the base. But as long as you stay in your lane and you keep the scraper on the ski, you're not going to screw it up, go ahead and scrape everything off. There is some idea that I've heard it said that you should leave a little wax on to take off with the brush. And there's no good reason for that at all. I believe the reason people do it is when they're using either a really dirty iron or an iron with poor heat control. They're damaging the amorphous material, and there's going to scrape Black Wax shavings off, they feel better if they don't see that. But that doesn't change the fact that they've already screwed the base up with bad practice in the ironing stage of it, right. So as long as you're doing good work, you should be able to scrape really completely pull clean wax shavings off, and then we're on to brushing. Brushing is simple. It's got a very, there's a simple objective, and it's a lot like sweeping the kitchen floor. You've got a dirty floor, and your objective is to get it clean. So what brush do you use? This is like the teenager asking, Well, Dad, fine, I'll sweep the floor. But what broom should I use. And after I use that broom, what other broom should I use, and I'm going I don't care what broom you use sweep the damn floor. If it's not clean afterwards, I'll make sure you know about it. So you can use a toothbrush if you want, but I don't care get the floor clean. So what we're trying to do with a brush is clear all the wax out of the structure, you know you've got this grind pattern that's there for a purpose, we want to get all the wax out of the little grooves in the ski, we want to get all the wax that you didn't manage to get with a scraper off the surface. And then maybe we want to polish the base. So I use basically two brushes. Like to if we're talking hand brushes, I use a fine steel brush because it cleans the structure out well. And I use a good fine, relatively short, relatively stiff nylon brush, that's a really good polishing brush and a scrub with that. So clean the structure with the steel brush, scrub with a nylon brush. If I haven't done a good job scraping the ski which is never the case because I always do a good job scraping, then I've got a lot more work to do. Or if someone hands me a quote unquote scraped ski and it's just got a massive film of lakhs like tons of lakhs sitting on the surface. There's big areas where I can't even begin to see the structure. Then I get the scraper back out and I re scrape. But if you're gonna really insist on trying to brush that crap away, you've got way more work to do with the brushes. And then you need kind of a really big coarse metal brush like Red Creek has this what we call a monster brush. It's like a hard steel and blue nylon. It's got really long bristles and it like creates a snowstorm and a super out of surface wax. So it's a great thing for a coach to have when the athletes are supposed to be scraping their skis and they're doing it in an unlit basement with a scraper that was last sharpened in 1978 when their dad got into the school.

Host 1:14:22

You gave it you gave me one of those brushes.

Zach Caldwell 1:14:26

Sorry, go ahead. Yeah, yeah. And there was a reason I gave it to you. I love that. You remember what I printed on the label? Yes,

Host 1:14:33

I do. It was very hurtful. In fact, I think Norris has that brush. I was looking for it the other day. It's fine. You said that I was prepping new skis. I'm like did Norris take my monster brush? I was at the end of this podcast. I'm like, I gotta talk to Caldwell but getting another one of those brushes

Zach Caldwell 1:14:54

wrote I can't imagine Norris was going to grab a brush that says right on it brush for ideas. It's

Host 1:14:58

probably in my truck. someplace but I looked I couldn't find it. So Norris if you have my brush, give it back. Well, what about a rotor brush versus a hand brush? Which way would you go with that?

Zach Caldwell 1:15:09

Yeah, rotor brushes are awesome. They're fantastic. They do a really good job. We, I grew up in a furniture makers shop, my dad, my dad made handmade furniture, I used hand tools. Growing up, like, like, like, they were toys, like I like working with my hands, I really appreciate hand tools. And I really like hand brushes. But row brushes do a better job, they just do. We've done a bunch of testing actually, where when I'm connected with a testing group, like you know, we're running tests at a superstore event or something, we got a couple different

teams assembled together and we're testing together, I might throw into the test to have exactly the same prepared skis, one brush by hand and one brush by rodo. Just periodically, I've done this over the years, just to test the brushing. And it's blind testing these guys don't know. But I'll be like, Oh, Austin, go out and ski these two skis next to each other. And let me know. And they always come back and say they're really close. But there's always a preference there, I was like this one might be a little faster, not totally confident, but I think it's a little faster. It's always the rotor brush ski. So it just, it works. Now rotor brushes work by replacing elbow grease and pressure with speed. The problem that we encounter is when people try to do both, so they get the rotor brush, they get a turning, and then they apply elbow grease and pressure and they maul the ski and bend the bristles over. Typically when we're working with roto brushes, and I've actually been involved in trying to design some roto brushes, we're building brushes with a little bit longer and softer bristles. And the longer the bristle, the more flexes in the bristle, the stiffness of the bristle goes down and it can deform more easily. And so really allowing the bristle to stand and not pushing down quickly. But allowing it to work really rapidly, I think might be why the roto brush is better because you're not smearing things, you're actually using the end of the bristle to get in and clean things out. But if you're gonna use the end of the bristle to get in and clean things out, you have to actually start with the belief and the understanding that you don't push down hard. You can't mash it, we see I've seen I have seen nylon roto brushes that were literally like the brushes, the brushes, the bristles were welded into class by feet from being pushed so hard and like what are you doing to this thing, you know, and like people who are blowing up the bearings on their roto handles because they're putting their body weight on him. It just doesn't take pressure, you replace the pressure with speed. And it's a huge time saver, and they do fantastic work. But once again, like there's about two or three rotor brushes that I use with regularity one is a steel brush because with hard paraffins they're just amazing at getting the surface wax off and clearing the structure. I actually have a horsehair brush that I really like as a secondary because often the steel in the roto brushes isn't quite fine enough to get all the way into the into the structure. And then the horsehair is a good follow up to help it out. And then a polishing brush is a good nylon polishing brush. Not a big stack of brushes. It's it's pretty quick process and is big big time saver and shoulder saver. And a better performing outcome. Yep.

Host 1:18:33

Awesome. What about classic? Walk us through? Again, there are 100 different theories out there. You know, Do you how many layers you put on? Are you

going to a pyramid? You know, I know that's a little bit condition dependent. But assuming, you know, let's let's just continue where we are the use case of you know, a PERT we were out last night and Brian Tate turned to me and said FPD This is a perfect day for classic it was like sunny and 10 degrees. So assuming you've got you know, a nice kind of cold day. Tell me what you like in terms of how many layers how you put them on. You know, if you iron in, you said earlier iron in a binder. So walk us through like just kick prep for a regular cold training day.

Zach Caldwell 1:19:31

Okay, so we'll back up just a second and I'll make really clear that every time we're encountering a race scenario, we're going to start with a very clean base including wax remover, and maybe a second coat to make sure that you don't leave a film on there. We want to clean dry base, and we're going to build up purposely with a base wax or binder. We test binders very regularly so we might we might spend more energy testing binders On any given race day, then kick waxes because binder is the layer where you can get both improved kick performance and improve glide in the same product by making the right selection and you make a way bigger target for your kicking wax. This is because the kick wax, the binder can provide a level of penetrability for the wax layer. And also sort of a layer of suspension. If we think about that, the layers of kicking wax as being like a film like a sheet of plastic or something that you pull over and the binders underneath it, you can imagine that that film being deformed or being like the layer, you know, the top of a mattress where it's got some deformation property, and also almost this level of horizontal displacement or suspension, some of the more rubbery binders are very high viscosity and very elastic. And you get almost a delayed hook up in the kick, but then a really big spike and kick power. And really fast skis because they can, they're pliable at a at a appropriate frequency for the conditions and you can you can end up if you test binder, you will find really improved speed and kick particularly once you leave behind the fresh cold snow that you Colorado people are so accustomed to. That's why you guys can't wax it at events, because it's always the same. But so for training, it's a totally different question. For training, I'll usually take a really good sharp putty knife, putty off the old wax without using wax remover to clean out the wax that's already been heated and bonded to the base. And I'll just start putting a couple layers on. You asked how many layers whether I pyramid and everything else? Well, when we select skis, we're selecting skis with a pocket shape. On purpose, we have you know, the wax is kind of a leaf spring, and it's got a shape like a you know, it's got a camber. And when you close it down all the way, there might be

some part of the pocket that still open in front of the foot or there might not be. But in general, if it's there, it's sort of there on purpose. And by design to improve the speed. The kick comes not just from contact, but from pressure and angular force contribution. So if you have a pocket that's got angles at the ends, but as flat on the top, when you push on the top, those, it sort of clamps down from the outside in, and you get like a really big contribution in force, particularly in softer snow, it can, it can have what I call gathering force, like it creates a clamping action that that makes better kick. And so the last thing we want to do is actually fill that up and turn that pocket into just a flat area. So what I don't like to do is map out the pocket height, and then just fill up all the layers until the thing is just a flat surface again, because now I've just made a flat, slow ski, I'd much rather just start with a couple layers of wax for the whole wax zone, test it add if necessary. And if I need more kick, I'm going to position the kick according to where I need it. If I need more kick, at the start of the motion, when I'm rolling from my heel for Well, I'm engaging the tail end of the pocket and I might pad up under foot, like literally under the arch of my foot, I might put on a little cushion of violet on a blue day and recover it with some blue just to get that initial bite. And then if I needed at the end of the kick when I'm kind of rolling off the toe and the ski is, is trying to compete and rebound off of this, the snowpack underneath my foot. The the kind of last holdout is going to be the front of that pocket, that Angular force contribution. And I might pad the front of the pocket with a little extra kick. But if it's a question of like a hard track situation, and I'm on pretty high skis, and I want to just be able to hammer the kick and get get a really high impulse kick but with a lot of depth support. So I can use really high force in the kick motion, then I'm putting on a higher viscosity cushion wax under foot where I've got the room to carry it. Still not trying to fill up the whole pocket but but trying to selectively put the product is going to support the type of kick support that I need where I'm going to need it in the scheme.

Host 1:24:30

Okay. I think that covers everything for just day to day training. Do you have any other pieces of advice and maintaining the fleet, keeping them ready to roll just daily operations. We I want to talk about racing next. But obviously everyone spends the bulk of their time training and some people that's how they spend all their time. So I don't want to be dismissive of this at all because, well, we're going into incredible depth here which I know certainly significant percentage of the audience likes. I think it bears repeating in particular with classic man it is, it is a beautiful thing when everything is going well. But it can be a nightmare when things aren't quite right. So I think people would be well served to take this advice

to heart. So I really appreciate you giving us so much thought and energy here. So I want to make sure that I'm not missing anything, either for skate, or I guess I should say, for Glide or kick. Anything else for like, just again, normal training, everyday training that you think is really important that something you see people mess up or anything to add there before we transition into racing.

Zach Caldwell 1:25:38

The thing I see far, far too often is people take way too much time and put way too much energy into waxing their skis, it really should be pretty quick and simple. So when we talk about ironing, you know, one pass with the irons going to get you 80% waxed, and you know the wax is never going to flow perfectly in that first pass. And so a second pass to get the wax fully covered. And then let the ski cool is enough. But it really shouldn't take you more than a minute to put wax on a ski with an iron. If it's taking you more than a minute, you need to evaluate your process and ask yourself why you're so bad at it. Like it's simpler. It's just it's just, it was just like ski technique, John, how many times we've been out skiing, and I'm like shave. You got to make this easy on yourself. Like it's a hard sport. Why are you trying to make it harder by like having perfect balance, you don't have perfect balance. So forget about it lean on the edge, like make it easy, you know what I'm saying? So it's the same thing, get good at making it simple and reduce the amount of time that you spend per operation. So that the net cost of maintaining your skis well is is much lower, which will increase the frequency with which you do it. It's it's totally like, I mean, I think you referred to it in the last podcast, where I talked about skis and children both being able to take more abuse than people thought, well, it's again, they don't

Host 1:27:02

use the word abuse. Go ahead.

Zach Caldwell 1:27:05

Well, your kids also both benefit. Yeah, they both benefit from a certain amount of benevolent neglect. So it just like, give, give them give them the attention that they need. But it's about them not about you like you don't have to stand behind the kid and say, attaboy, you know, just recognize the effort, when it's there like to say, say thanks to the ski, when it does a good job, clean it and put more wax on

and put it to bed. It's just not that hard. Like, you don't have to be everything to your skis. You know, it doesn't take hours, make this as short and simple. This, like,

Host 1:27:42

this is a perfect transition to this next topic, because you mentioned this at the onset of our discussion today. And I brought it down in my notes for this specific part of the conversation. I love what you said about the energy cost. And I think it's such a great point for the self supported racer, or really, for that matter, just the self supported skier. Because when you start talking about high energy costs, situations, like races where nothing is easy, you know, you can't just cook at home. I mean, sometimes you can you have a condo, but a lot of times, you know you're drunk, you're at a condo, or you're at a hotel. So you're driving to the venue, it's not close to home, you're driving to restaurants, you're with a team, you're with a bunch of people, nothing's fast, nothing is easy, you usually don't have your home setup, you know, you're sharing forms with a bunch of people, you know, there's a variety of things that go into this. And I think it's a really it's I was, I was surprised, I kind of chuckled to myself, when you call me by surprise a little bit, even though I've known you forever, because that's something I've always really believed in. I think there's an inverse relationship between speed and input. In particular, you know, time spent waxing in particular, if you're not particularly proficient, and I'm not even talking about chasing your tail and doing a bunch of other things I'm talking about, let's just assume that you're, you make all the correct calls, but you're not particularly speedy. And you spend two hours if you have to drive where you're gonna go whacks as opposed to spending 15 minutes and being at home back at the condo with your feet up, you know, having a beer watching Netflix or whatever, getting rid of the race tomorrow. So I think it's a really, really good point. And so I broken down racing into two categories here. So we're going to talk about sort of a b slash C priority race, which for those of you who aren't 100% bought in and of a Nordic nerd stuff, you know, this is your local race, you've got something, you know, it's something fun you'd like to do it. It's nearby, you know, maybe it's, you know, something that you do You know, there's like a local talent series or something like that it's not a huge deal, you're not flying there, you want good skis. But you don't want to put a ton of time and energy into it, you've got other life activities. So walk us through, if you would please, how you would go about getting race skis ready for that scenario. And just let me preface this by saying, we're also going to talk about, you know, Bercy masters worlds, you know, a big fly to event where, you know, you're gonna be there a couple of times, because that's sort of a different kettle

of fish, in my opinion. So let's talk about the, you know, the local town series or something that you want to do well, but it's, again, there's another one in two weeks, and you know, you've got a big presentation at work, the kids have a play, and the dog has diarrhea, you know, so you don't have 15 hours to be futzing around with your skis. What do you what do you recommend assuming that you've listened to our advice from this in the previous podcast? And let's just say you've got, it's a skate race, and you've got two pairs of skis, what do you recommend?

Zach Caldwell 1:31:10

Yeah, so a lot of this is going to depend on on starting point resources, how much you've got. And yeah, if you've, if you've got a fleet of seven pairs of skis, the first thing to do is to narrow it down based on your expectation for conditions to a couple of likely pairs, and then maybe bracket them a little bit. So you're going to set one up a little warmer and one up a little colder. The second thing is that if you have access to local information and knowledge, use it, it's always very valuable. There are lots and lots of, of sort of established points of wisdom, if you talk to someone who only skis in the area where the race is, and they're like, oh, so and so is such an essential wax is always the best, you know, it's like star green and Toko cold powder combination, like you can't beat it at the alley loop or whatever, you know, like, right? Well, if that person skis in Crested Butte every day, then just go out and get some stark green and total cold powder and put it on the skeet. Right, you know, you just you're not going to out wax them from home without that understanding and without any ability to test. So if you're going to the up of Michigan, if you're going to the Cuban Peninsula, you better have a layer of graphite underneath your your paraffin. Because it's just always better if you're, you know, they're just there's certain types of local knowledge that you should avail yourself of. So look at the results sheet figure out who's you know, who's a local and who does well every year, and like, look up their Facebook information, I don't know when to get in touch with them. direct message them figure it out, be like, dude, what do you run on? What's good there? People love to talk about themselves anyway. So they'll always share their secrets or maybe they're really cagey and they won't. But local knowledge is awesome. If you have access to it, use it. If you don't keep it simple. ballpark it. Should you run graphite. No, not unless you know that it's going to be better. Because if it's not better, it can be a lot worse. Should you always wax colder than the recommended iron, you know, the recommended range on the on the lacs box because it's safer. Now, it doesn't work that way. Should you always use Swix marathon or roadie endurance or this new star durable product? Because it's

universal and it always works. No, no, it doesn't actually always work. It's you know, broad range. But you still need a certain type of snow for it to work, work with what you know, if you don't know enough to select a specific product, then work based on the forecast and a wax line that you trust and have worked with and had success with before. And then if you got two pairs of skis, you can bracket it. Maybe, maybe you bracket it according to conditions and you're like oh, it's the venue has manmade snow and it's mostly on a manmade loop. And even though there's natural snow, I expect it to be modified. So I'm going to do one setup with this flux marathoner that's really tough, durable wax and then the other one for more natural snow with like a cold product. And then I'll have my bases covered. Or maybe it's in that transitional temperature range where it's cold overnight, but by the end of the day, that temperature is going to you know, by race time, the temperature is going to be 28 Fahrenheit, and you go well, I'm going to do one cold and one medium product so that I'm bracketed in terms of temperature. And then you just test the skis because the solutions are done. You don't you don't show up and worry about it. You put the skis on the snow. As soon as you put skis on the snow, you forget about what you did to them. You're testing for detectable differences. And the only time that you're going back and saying oh, maybe I should choose the warmer one. is warming as if they're really close. If the colder one is lights out better go on the colder one. If they're the same, and you know it's warming, go on the warmer one. But like don't make it hard.

Host 1:35:11

I like that. I think that's great advice. Don't let's talk about a bigger race. So a lot of listeners here you know, the Berkey is a big training event. You mentioned craps very marathon Boulder Mountain tour rendezvous. You know the real Berkey Vasa you name it, you know lots of people fly into you're invested you're getting on an airplane making a long drive. You're probably gonna get there a couple days early. You know, it's a it's a big event for you, you know, you're invested financially and logistically, all ILO thing. So you certainly can bring, you know, someone in that scenario probably is going to have a couple pairs of skis, what would you recommend in terms of, let's pick an easy one. You know, and it's such an iconic race, it's near and dear to my heart, and everyone should do it. The Norwegian Bercy, it's just if you're a skier, you got to do it. So you're gonna, you know, you're gonna go over there, you're gonna get there a couple days early. What do you recommend in terms of again, it's, you've got a fleet of, let's just say you've got three sets of classic race, skis, classic race skis. How many of them, do you recommend that you bring? What do you recommend in terms of,

you know, you've got, oh, let's say three days of skiing before you want to test every day? What are you trying to accomplish? You know, walk us through that process for a big race where you do have a little bit more time to get on the course. All of those things? What, how would you handle that situation?

Zach Caldwell 1:36:44

Yeah, no, that's, that's another great question. And the races that you've named are particularly tricky, because they're, they're long distance events that are often point to point. And it's really hard to see the whole course. So once again, a little institutional knowledge helps a huge amount. If we're talking about the Norwegian Birkebeiner, you kind of know that the first, what 15 kilometers or uphill, and that often it can be warm at the start, and it's going to get way colder as you climb. And then maybe you don't need perfect kick at the start, because you're going to have super slow skis in the mountains. Or maybe it's the American Birkebeiner, and is brutally cold at the start. But you know, the second half is really important, and the other side of who runs warmer, and, you know, maybe, you know, maybe you you know enough to have thought ahead and pick your skis and wax combination for the second half of the race. So institutional knowledge about the event is critical, then you have this sort of local knowledge about product and process, like, what's working, how's it going, those big events always have some industry presence, and usually have wax recommendations published that can be really good for context. But I can tell you how those good made up from typically quite a long way away, by looking at the forecast that you have access to as well. And reading the containers, you can usually tell if someone's on site doing testing, if you if they're publishing test results. That's like gold, that's awesome. If someone's actually publishing test results, otherwise, a wax recommendation is probably not much more use than reading the box, right. And then yeah, any, any access to information is great, especially if you know that people are doing good work and actually putting product on the snow. And then finally, you can do some testing yourself. And this is where it's easy to go down the rabbit hole and invest way more energy than you have the ability to maintain and you have to sort of timeline your preparation and work backwards through where your opportunities to make decisions and put them into effect are. So if we start at the start, you're standing on the start line, you have shed your warm ups and put them in a bag, you've taken transport to the start. You may or may not be parked nearby the start. You might be parked in Lillehammer and have taken a bus at three in the morning. Right, right. Yeah. So you have you have one pair of skis and you have your warm ups, and they're going in a bag and by some miracle, they're going to end up at the finish you hope. Right? And

so you can you can you can bring some wax a little bit of wax to touch up your skis, or at the American Birkebeiner maybe you're in the parking lot, but like again, you're you're you reach a point where you're committed, and there's no option to have a lot of material with you there so that decisions need to be made pretty well in advance of that point. That's always going to be different for every event. And if you have if you're doing the Boulder Mountain tour, and someone's going to give you a ride up and drive back down and you can run you know No skis at the start. And you know that the course, after, you know, running some loops up high and cold snow is going to run down Valley at high speed like, you can make informed decisions by putting your two or three pairs on the snow and skiing and at the start. But most of the time in these big events, you're kind of forced to make those decisions earlier and limit your choices. So a lot of race day testing often isn't practical. Therefore, because you're not raised a testing, you are necessarily kind of ballparking the whole thing. This is where in the days in advance, you can gather information about the conditions, you can figure out what the grooming plan is from the organizers and seek out similar opportunities. You know, if the weather is going to change massively, everyone's in the same boat. They're all punting. Everyone's just trying their best based on a forecast and expectation. And so your guess is as good as anybody's used robust solutions that have a wide range, and that's going to be your best bet. But if it's relatively stable, then it's it's worth investing some time to get on the snow at different places in the course, I have always felt that eyes on the course and skis on the course at any level of race is worth more than many, many tests run within 200 metres of a wax cabin. If we're working with a team at a superstore, we want someone to get out and ski the course, we want that information. If we can get three people out on the course, then we can get six different products out there. Okay, and we can get information from the whole course, I would much rather have a consensus on field testing around the course from three good texts on six different skis than to have controlled glide outs of 16 different products in the stadium. Great. So global information, getting out and see and getting gaining context, seeing what's out there, and that you're going to have to deal with on race day is going to help you make better decisions than running tests in a non representative area. And so I think, really at that point is just deciding how much work you can do and what makes sense. It's easy enough to like if you're if you're in a skate race, and you're you've gotten good at testing skis, it's easy enough to put two different products on two different skis and run a really quick test, you make up your mind pretty quickly what's going to run faster. And then you've got to take that information and make use of it and make decisions, maybe you've got two pairs of skis and you can run four different products. Go for it, you can learn a fair amount, maybe you could run two different iron paraffins over two

different underlayers like a graphite and or not graphite, and figure out whether you like the graphite, which paraffin you like you can do a little matrix there by combining variables and and develop some understanding of layering. And then you can take those skis, you can take your winners, put a liquid on top of the loser and see if you can get past the winter, you know, you start, you start staggered testing, where you're adding variables, looking for solutions that improve the the whole picture. And well, it's not perfectly controlled testing with a product line that you know pretty well, you can start to find a path that leads you in a good direction. And it's, it's never going to be the output of a World Cup wax truck. But as long as you have robust waxes that work well in a broad range, and you know how to use them, you'll, overall you'll you'll make good decisions, just don't spend time trying to be perfect, because it ain't gonna happen.

Host 1:43:49

I think that's those are all great points. And I think for a lot of serious self supported racers, you know, they see the big fancy wax truck, the 15 guys in the matching costume out there trying every combination. And when you get to, I don't care what race it is, it is nothing like that, like you said, for the most part, you know, Berkey or, you know, real Berkey you can get on snow a little bit kind of sort of beforehand. But for the most part, you're you're just winging it. So I think that's Ray said, great, great advice across the board. kind of wrapping up me, let's say

Zach Caldwell 1:44:22

you even have access, let's let's, let's say you have an awesome setup, and you have a fleet of eight pairs of test keys. And and you're gonna get there early enough, you could spend two days running controlled tests with a speed trap. You're burning a massive amount of energy and you still haven't seen the course. I would say that if you spend a fraction of the time that you have spent preparing and testing all that product on your own behalf and instead you know, you drive to various different points at the course and even if you're saved the course is closed and you're not allowed to ski on it. You get Now pick up and sniff the snow, like, get your eyes on it and see, see the task, you got to learn, you got to get the scope of the whole the whole day and have an expectation of what's going to come and just make decisions based on institutional knowledge, you're probably going to come out better than trying to run a ton of controlled testing, and you're gonna spend way less energy doing it.

Host 1:45:20

Right? What would you say the most important, the biggest piece of advice you can give to the self supported racer for you know, an eight priority race in terms of getting themselves fast skis, what's the best thing you can do?

Zach Caldwell 1:45:35

Team up with a bunch of buddies divide and conquer, accumulate information together, you can farm out testing if you're working with a similar wax box. And and you've got a number of assets, you know, you can have someone test hands structure, you can have someone Test, test underlayers, you can have someone test liquids, you could have, you know, you could go and do a recon of the course, if you got if you got a bunch of friends that are traveling together. And you work the way we approach a superstore, where like a lot of the teams don't have a huge staff and endless resource. But if you pull resources for the common good, you can do really high quality world class testing and everyone benefits. I think that way of thinking is a really good thing. And it's one of the nice things about American cross country skiing, even up to the highest levels, I see a really big tendency, among the, you know, the American community to share information and help other people be better and accumulate information from other teams is not that cagey. It's a pretty open thing. And, yeah, very often you can, you can benefit by combining resources, and I believe that can work at at a master's level, it takes a little communication and planning, if everyone shows up on their on their own program, and like one guy's got Toko and one guy's got, you know, Swix and one guy's got whatever, you know, everyone's got their own thing. And they insist on using their own wax, and there's no way they're all going to benefit from each other, then then they're just splitting roaming costs, right? But right, if they coordinate a little bit, if they make some plans, you know, and, and figure out how to get how to broaden the stance and take combined resources to get better information, I bet you can come close to doing as well as some of the pay services that are out there, you know, working with way too few people way too many skis and, and, you know, still limited access to the course.

Host 1:47:31

What's the biggest mistake you can make, in terms of trying to get fast skis for a priority race. Ah,

Zach Caldwell 1:47:43

I think trying to outsmart the situation is probably a good way to describe sort of an umbrella that captures a lot of different mistakes that can be made, where you're trying to put your mark on it, you're trying to out wax the competition by getting ahead, you know, you're, you're anticipating massive warming, and you think that the wax that kicks at the start, won't have enough kick at the end. And so, you know, it boils down to like waxing for the final climate, the Marcia laga and having to double pull that wax down Valley for what is it 60 kilometers before it even becomes a consideration. And the guys who like didn't even put any wax on their skis can stop and get the dudes to roll cluster tip to tail and just run it home. You know, it's like, there's you just, that's what it is. You can't win by trying to out and try to outsmart everything you just, you know, you got to you got to take what's in front of you and address it. I have gotten in so much trouble with my wife for trying to wax for what we think the conditions are going to be at the end of the race. And then it doesn't happen. And I you know, I continue to make that same mistake is like, oh, it's going to get warm. It's going to get warm. I I screwed up the wax at craftsbury marathon a couple of years ago by putting on something that was like right on the edge of icing at the start. And I'm like it's definitely warming. There's no question. Well, it didn't warm and the snow way down low was drier rather than wetter. And the skis iced, you know, and it's because I wasn't waxing for what was in front of me. I was trying to outsmart a situation where I had not gone out and checked the context. I hadn't gotten the full scope. So as long as you're staying in one place, and trying to anticipate what you haven't bothered to go look at, you're very likely to go screw up. That's why I said instead of doing a ton of testing in the stadium, go out and look at the course. What what what is it running like out on Sam's is it warmer because it's south facing or is it dry? Because the winds coming up the valley? What's you know what's happening out there? That's That's pretty good information to have, if you're trying to outsmart the circumstances lacks for what's in front of you unless you know what's out there.

Host 1:50:07

I love that wax for what's in front of you. I love that's great advice. All right, so let's talk about once once the race is over, either big or small race, you know,

you've got race skis. You want to keep them in good shape, you got to travel home, and we'll talk about that in a second. So but let's just talk about physical ski prep, you know, you don't have florals on them anymore. But what do you you know, I guess there's sort of two, in fact, you and I had this situation in clusters, we were running around, trying to get something trying to travel X excuse to get home. So I guess there's sort of best case scenario. And then there's some times, you know, what, what you have to how you sort of make do so why don't you give us sort of both, like, you have access to an iron, you want to, you know, if you can travel wax, or if you can't, so, kind of give us a couple like, bare bones minimum, and then best case scenario, just in terms of ski prep to get back from your race.

Zach Caldwell 1:51:03

So travel wax is awesome, because it protects the base from impact and scratches. Right. That's, that's really what you're gaining from putting travel wax on. The problem is, we are at the Marcia longa. Okay, and we drove over from clusters for the race. And the this specific scenario, we had a wax cabin for Masters World Cup, and we were trying to prep skis, over in clusters for the the martial manga is a long drive away, there's no facilities over at the mercy of manga, and you're skiing. Literally on roadsides, there's shoveled road crossings, there's all sorts of pollutants and dirt everywhere. And it's a long race, and you finish that race. And the question is, do we want to just take that ski? And with whatever is at hand iron wax on to it, knowing how polluted it probably is? And the answer might be like, wow, you know, what, if instead, you brought, like, the ability to isolate your skis and cover them like a sock or something, you could pull over the whole ski, or maybe like, yeah, some old athletic socks over the tip and tail, and then put your ski ties on and, and like, make sure that the skis are protected by something, even if it's not wax, and then you can go home and use cleaner, and actually get them clean, and like do the job, right. So typically, post race, you know, the task is to clean the ski, and zero back out and get it ready for training again. And normally, that's going to involve, you know, ironing, some appropriate layers and everything else. I guess I feel as though if you are self supportive master skiers, probably easier to protect your skis. Using something other than wax, if you're a team trying to put 18 pairs of skis in a bag, you better have some wax on him. Because there's no way to protect every pair of skis in that case, and you need a good travel wax. If you have access to a wax roller, that's awesome, because you're not heating the wax and you're just putting a protective layer on and it'll pop right off. But again, what we don't necessarily I

believe at this point I want to do is just willy nilly go ironing skis over the base without doing some cleaning first.

Host 1:53:26

Right, right. Well, and this actually dovetails perfectly into the next part about this question. And we've all been down this road before too, is you know, you you're trying to squeeze in the race in between work and life commitments. And so you know, you're crossing the finish line hauling ass for the shuttle, getting back to the rental car and then be lying to the airport. So this is sort of the assumption here is that this is a race that required air travel. What's your recommendation on how to optimally pack the skis, your your race fleet for air travel? How do you put them in the bag? How do you load them? How do you protect them?

Zach Caldwell 1:54:14

While so there are some things you're not going to be able to protect against, they're capable of actually like physically snapping your skis in half. And that's going to happen regardless of whether you pack some T shirts around the tips and tails. They're almost certainly going to drag them along the tarmac for a while and maybe drag a hole right in the end of the bag and drag some of your tip off. And I don't know how much you can do to prevent that. But most of the damage that occurs is damaged that the skis do to each other when they're not well bundled together. So once we've protected the bases from each other, I like to bundle the skis base to base with or without ski ties. But then I like to put the skis side by side and I use cling wrap and it's easy to pick up at the office supply storage Just a hand roll of claim wrap, and I just make a tight bundle of the whole thing. I want the skis to be one brick of material that can't possibly come apart. Tape makes a huge problem is it's a nightmare trying to untape people people. People go to lengths shipping me skis for grinding. Like sometimes I've got a half an hour of work to unbundle skis to someone shipped for grinding, because they're so carefully packed and that's awesome person's never gonna have damaged skis, but I still hate them. Because you can just you can just cut it off. Yeah. Okay, so once you've got your brick, once you've got once you've got your bundle, and the skis aren't going to move against each other, that means that they're not going to damage each other. That means you've got one item that you're trying to protect not a bunch of loose items. And that includes poles, put some padding against the skis, unbundle your poles, right against the skis, or your pole tube, get it all in there together. And then you know, pack some of your

some of your outdoor clothing into the tip and tail. And, you know, a little padding at the ends is probably a good idea. And it's really hard to do much better than that. Okay.

Host 1:56:14

Seasons now over. We've had a great year training racing, it's time to take a little time off, do some surfing, and then get ready for summer training. What is the optimal protocol for summer storage for re skis entertaining skis?

Zach Caldwell 1:56:35

Well, let's, let's talk about what's going to harm the skis and how to avoid that. If you ski this skis, dead dry at the end of the season, like you know, remember we were talking about how an Lerab iron paraffin probably has a couple 100 kilometers on it in Colorado, but it's spring and now it's corn snow, and it's more aggressive and it's dirty. And it's definitely, definitely wearing the wax out more quickly. So, you know, under that circumstance, you've skied 75 kilometers and didn't bother to relax your skis. And that's the state they're in. They're filthy. They've got mud in the bindings and all over the sidewalls. And they're scoured dry. And if you just leave that, then the base is going to be in really rough shape. If the last time you went skiing was in BEAUTIFUL PRISTINE bluebird conditions and you had just hot wax your skis and then scraped and brush them and gone for a 15 Kilometer ski and stepped off the snow and put them in their ski ties and back in the bag. Nothing bad is gonna happen to those skis, leave them in the bag, take them out in the fall, brush them and wax them and go skiing, they'll be totally fine. Can you understand the difference there? How like one of those skis probably really needs to be thoroughly cleaned and waxed. And the other one probably is just about fine. It's got wax in the base, it's in a bag so it's protected. Really, no big deal. It hasn't got closer on the sidewalls like so the bar isn't that high, it's just don't abuse your equipment is like don't put the horse up wet. Do you need to actually like mummify your horse for the overnight no just like, like cooled down before you put it in a stall. And it's probably going to be okay, when you turn your back. It's nothing, nothing crazy happens over the summer. But if the skis are in really bad shape, when you put them away, they're not going to get better over the summer and you're going to have to address it and if the base is dry, and as exposed to the air and or sunlight and or heat, then yeah, it can get it can harden off you get into that you know, the old car dashboard and the sun scenario where if you at least have some wax in the base still and the ski ski has

been well cared for to the end of the season, that's fine. at a bare minimum, you could just brush the dirt off and put a layer of liquid wax on and you're done in 47 seconds and you can kind of rest a little bit easy and probably the ski will be just fine. What you don't need to do and and there's no good reason to do it is bade the wax this key in like warm summer wax. Because why and what it doesn't accomplish anything except create a really big mess to clean up in the fall. Just protect the base. That's all put it in a bag if you if you can.

Host 1:59:33

That's exactly the question I was going to ask you. Because again, that is one of the most pervasive rumors that you always hear about, you know, summer wax storage racks or travel wax either, you know, telco red telco yellow, you want a soft, warm wax that again that's going to soak into the base even though we all know that that doesn't exist. So you don't even think you need to put storage wax on over the summer. If you You know, if they're if they're in decent shape

Zach Caldwell 2:00:06

last year for a minute.

Host 2:00:09

I said, so you don't think it's even necessary to put on storage wax over the summer?

Zach Caldwell 2:00:17

I think it's a good idea to put on storage wax. I don't always do it. I mean, you know, if I, I like, Do you know how many pairs of skis I have in my attic and how many pairs of skis I ski on every year, and like, by the time I'm at the end of the season, how sick I am of looking at Ski bases, like just going upstairs and they're gonna stand up. And they're not, you know, they're not in a super hot environment, and they're not dirty, and they're fine. I'm gonna Clint, you know, run a cleaner on him in the fall and get him ready to go and they'll be good.

Host 2:00:52

I think there are masters skiers all over the world right now. Is that breathing a huge sigh of relief? I would have guessed that you were that guy? That was me. No, no, no, they disagree two hours of summer.

Zach Caldwell 2:01:03

No, no, I'm not. No, no, no, the people are so invested in the work they've already done for their whole life. And they're, they believe so firmly in what they've been told. And ascribed to that they don't want to hear this. There gonna be people that are angry about this.

Host 2:01:22

That's why we're doing this podcast. Changing Lives. One pair of storage wax at a time, Zach. All right. We're almost done here. But let's talk about any other do's and don'ts. Overall, for waxing, ski care, ski prep, you've been in the industry a long time at a pretty high level, you've seen lots of shit, Give me high level do's and don'ts. If we haven't hit anything big. I want people to walk out of this taking better care of their skis than ever before. Anything else that you want to add to this.

Zach Caldwell 2:01:59

So you know, we could do a whole podcast on the ways that people damage skis. You know what not to do that we see with a lot of frequency. The big things are using a bad iron. Thinking that you're doing the ski a favor just ironing it for ever. You don't like the total accumulative amount of time in a wax application of iron on ski before you allowed to cool and scrape and brush should be under one minute. Told Yep, parallax application. Okay, so limiting the amount of time you're working to an appropriate amount of time for ironing the wax into the base is critical. The most of the damage that I see done to skis is done by people that are trying too hard. They're working for too long, they have the iron on the ski for way too long, and they're cooking the inside of the ski, or they're cooking the amorphous material in their base and turning it into porridge. That's far too common. Alternatively, they're they're being really haphazard about it, they're not completely scraping the skis, the skis don't operate well. And they're then you

know, waxing, over old wax has been skied on and has a ton of dirt in it like you want to do careful, consistent, considerate, complete, work quickly and be finished. Know your tools, get a good iron, keep your scraper sharp, keep your brushes clean, you don't need a lot of tools, you need a good iron, you need a good scraper in a way to sharpen it. And you need a handful of brushes like a small handful. Not very much. You need waxes that you know, but you don't need a ton of them. And you know how to end you need to know how to use them and know how to stop using them.

Host 2:03:55

On that note, that seems like an awesome place to stop. Zack, this has been incredibly insightful and helpful. And I really appreciate you taking so much time out of your day. Because, again, you know, there's so much I think I use the expression whisper down the lane. Kind of anecdotal stories that get passed around and circulated. We all know how that goes. So to have someone like yourself go through and break down and is there's also things you know, the technology changes. And so what was right 20 years ago, I think you alluded to that earlier, may not necessarily be right now, so I can't thank you enough because this has been very, very, very valuable.

Zach Caldwell 2:04:38

Okay, we'll find out what people have to say about it.

Host 2:04:42

Well, that's an excellent segue to the very last point is, remember, we have one more podcast with Mr. Caldwell. And this one is exclusively a question and answer. I'm not going to promise that it's going to be any shorter, but um We have gotten some great questions and we'd like to see some more. So send in your questions for Zach to either, you can send an email to info at Nordic insights with an S dot news, or DM me at fast underscore Big Dog on Instagram. And as much as I'd like to believe that everyone out there is sitting on their edge of their seat, eagerly awaiting the drop of each and every one of these podcasts, do recognize that people least some people have other things to do. So what we're going to do is we're going to have another guest on next week to give people time to listen to the podcast and organize our thoughts and send everything in

and then we'll be back with Zack the episode after that. As always, I'd like to thank my producer Wolfgang for the cosmic guidance. My audio engineer Nathan Shuttleworth for helping this sound least somewhat professional, Gavin and Morgan for their good ideas, memes and just generally keeping the site running. And last but not least each and every one of you the listeners. None of this happens without you and I deeply appreciate each and every one of you finding time in your busy day to listen to these episodes. Thanks again Zack and everyone listening and we'll see you out there