



The Ortovox Alaska's weak material could not hold up to digging and chopping blocks.

☹ **ORTOVOX ALASKA D**
Life's a Beach

Mechanical Characteristics and Stability: The blade of the Alaska D shovel deformed very easily. When pushing the blade into debris, it deformed dynamically and almost popped out again. The deformations quickly became permanent. There is too much play at all locking points (blade/shaft/extension).

The size of the blade allows movement of large amounts of snow per scoop and is not too big for a weaker shoveller.

Conclusion: The Alaska D has a very good D-shaped handle and a nice foam/rubber grip on the shaft. The only complaint about the additional grip material is that snow sticks to it, making it slippery to handle.

The Ortovox Alaska D was well liked by the testers, but unfortunately it is mechanically weak. This could potentially be a great shovel for avalanche rescue if manufactured with appropriate material.



During testing, the BCA's shaft bent near the blade attachment until it finally snapped off completely.

☹ **BCA CHUGACH PRO EXT**
Life's a Beach

Mechanical Characteristics and Stability: The big blade of the Chugach Pro showed little deformation, but the shaft slowly began to bend where it meets the blade and eventually broke. Even though the oval shaft is strong for levering; it was unable to handle the forces it is exposed to at the connection with its large blade.

Conclusion: Shovel blades of this size only make sense for particularly strong individuals. All other components, like the shaft, should be designed to withstand these forces. A shovel in this size targets a user group who would expect the lower shaft to be closed with a cap so that snow won't fill up the shaft.



Not a Voile shovel

The Mammut Expert simply folded up under pressure.

☹ **MAMMUT EXPERT**
Life's a Beach

Mechanical Characteristics and Stability: The blade of the Mammut shovel deformed very easily. This shovel was also used in the companion-rescue field test in 2008 and the V-shaped excavation field tests in 2007, and it has consistently displayed the same failure pattern with over 10 shovels. Some failures have occurred at the neck of the blade where the soldered back side broke.

Conclusion: Ergonomic handle, almost oversized and therefore rather big in packing size. Very weak blade.



This G3 model held up well during testing, showing only minor deformation to the top edge that did not affect shovel performance.

☺ **G3 AVITECH D-GRIP**
All Mountain

Mechanical Characteristics and Stability: The AviTech is manufactured with 6061 T6 alloy and withstood the tests without problems.

The shovel has a nice flat top for pushing the blade into hard avalanche snow with a boot. However, the radius is a bit too small towards the upper end, so some permanent minor deformations could be seen.

Conclusion: This proved to be a good sturdy avalanche-rescue tool. The D-grip handle is too small and not optimal in shape for rescuers with big hands or gloves. Top handle bar should be round for ergonomic glide while shoveling.

☺ **VOILÉ TELEPRO T6** [Click to see photo](#)
All Mountain

Mechanical Characteristics and Stability: All the features one would want are contained in this family of shovels.

The Telepro T6 is manufactured with 6061 T6 alloy and withstood the rigors of testing without any problems. While being subjected to the same abuse as other shovels, Voilé blades were unaffected by destruction or deformities. The top of the blade was almost square, providing a good platform to step on, with excellent transfer of power. Though simple, the straight leading edge of the blade was reliable and durable. Finally, it comes with a telescoping shaft and a D-grip, the hands-down grip of choice for comfort among our testers.

Conclusion: This a good example of how an avalanche-rescue tool should perform: sturdy and ergonomic. A very good choice if you are not concerned that every single gram must count. For serious professional avalanche rescue and daily snow observation.

☺ **VOILÉ XLM PRO** [See Voile Mini Telepro T6](#)
All Mountain [Click to see photo](#)

Mechanical Characteristics and Stability: The XLM Pro is manufactured with 6061 T6 alloy and withstood the tests without any problems.

This model has a smaller and thinner blade than the Telepro T6, but includes a telescoping shaft with an ergonomic D-handle.

Conclusion: A very good choice if you are looking for a sturdy, yet fairly lightweight, ergonomic shovel for touring. The weight is comparable to a heavier plastic shovel.

☺ **VOILÉ XLM** [Click to see photo](#)
All Mountain

Mechanical Characteristics and Stability: The XLM is manufactured with 6061 T6 alloy and withstood the tests without problems.

Compared to the Telepro T6, this model features a smaller, thinner blade and a very short shaft with a T-grip handle. Testers complained about shoveling discomfort with such a short shaft.

Conclusion: Sturdy and extremely lightweight. A good choice if weight is the most important criteria. This model's weight is comparable to the lightest weight plastic shovels available. Despite its weight, the shovel is very sturdy, yet sacrifices some ergonomics.

Declaration of neutrality: All equipment rated in this study was purchased and paid for by the authors, and none of the involved parties are in any way involved in the manufacturing, sales, or promotion of any of the tested equipment.

This research project also includes a section on avalanche probes; watch for the probe ratings in TAR 27/4.

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SHOVELS TESTED

	weight	packing length	short length	extended length	rating
BCA Chugach Pro Ext.....	1128g	59cm	88cm	109cm	☹
Black Diamond Transfer 7.....	780g	43cm	71cm	89cm	☠
G3 AviTECH D-Grip.....	775g	46cm	65cm	87cm	☺
Ortovox Alaska D.....	905g	50cm	78cm	97cm	☹
Ortovox Grizzly.....	838g	48cm	NA	87cm	☹
Pieps Pro.....	738g	46cm	72cm	99cm	☹
Stubai.....	775g	48cm	67cm	92cm	☹
<u>Voilé Telepro T6.....</u>	<u>840g</u>	<u>50cm</u>	<u>79cm</u>	<u>99cm</u>	<u>☺</u>
<u>Voilé XLM Pro T6.....</u>	<u>665g</u>	<u>45cm</u>	<u>71cm</u>	<u>85cm</u>	<u>☺</u>
<u>Voilé XLM T6.....</u>	<u>520g</u>	<u>36cm</u>	<u>61cm</u>	<u>NA</u>	<u>☺</u>

see rating categories on page 28



The shovel and the damage done: Several testers experienced severe damage to their ski boots, produced by the sharp edges and corners on top of Black Diamond's Transfer 7 shovel blade.

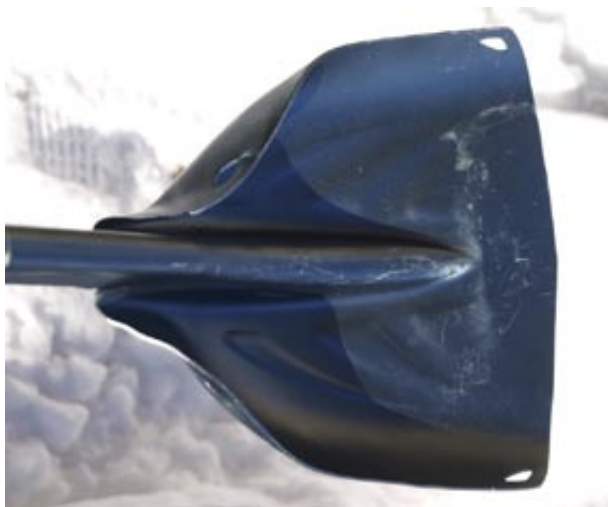
PERFORMANCE RATINGS

continued from previous page

BLACK DIAMOND TRANSFER 7
Hellish

Sharp, Cutting Edge on the Top Side of the Blade: Like all smaller Black Diamond shovels, the Transfer 7 has a sharp edge on the top side of the blade. Since the blade design features a rounded top, shovelers must press their boot next to the shaft, right onto this cutting-edge feature. These shovels were removed from testing after the ski boots of three participants had been severely damaged by this sharp edge. The Vibram soles of the ski boots were severely damaged, and in one case even the rigid plastic shell of a Scarpa Denali boot was nearly destroyed.

Mechanical Characteristics and Stability: The Transfer 7 shovel cracked where the ramp angle of the blade starts to change toward the shaft of the shovel. The small radiuses on the upper end of the shovel blade cannot withstand the force applied to the shovel when cutting blocks and pushing the shovel with the ski boot into the snow, leading to severe deformations.



top: The Black Diamond blade broke at the starting point of the shaft holder.
bottom: The blade's material could not withstand the force to cut blocks, severely damaging the upper end.

Conclusion: In addition to cracking and deformation to the shovel itself during use, Black Diamond's largest and most rigid shovel caused extensive damage to plastic ski boots. Due to a rounded shape of the top of the blade, it is difficult for shovelers to step on it with boots, which makes cutting blocks harder. The trapezoidal shaft is strong with good surface structure on the metal. The T-grip has a good ergonomic shape, better than most T-grips, but the size is too large for a person with fairly small hands to utilize effectively.



In short order, the Pieps blade was so severely deformed and cracked that the shovel could no longer function.

PIEPS PRO
Life's a Beach

Mechanical Characteristics and Stability: Unfortunately the Pieps Pro shovel broke before two holes of 2m burial depths could be excavated. The initial failure starts in the front center of the blade parallel to the company logo which acts as a weak spot. Even while examining this shovel in the shop, the blade clearly seemed far too soft to withstand an avalanche-rescue environment. This observation later held true during testing, as the sides of the blade bent outwards in short order during shoveling – effectively destroying the structural integrity of the blade.

Snow Cutting: The blade cuts snow nicely but is too weak to withstand the forces an avalanche shovel is subjected to.

Shaft and Extension of the Shaft: The T-grip was not the preferred shape of most of the participants. Pieps Pro has an asymmetrical shape for the locking knobs that allows the shovel to mate easily onto the shaft.

The additional grip on the shaft is strong and shredded gloves that didn't have durable surface material.

Conclusion: The Pieps Pro is by far the weakest and least recommended product in the *Life's a Beach* category. Unfortunately, this illustrates that some manufacturers do not appear to test their products in the real application environment before they are thrown on the market. In particular, safety equipment should be thoroughly tested by the manufacturers, as well in the hands of end users.



Stubai's locking bolts fell apart in different positions on several of the shovels tested, rendering them useless.

STUBAI
Life's a Beach

Mechanical Characteristics and Stability: Rigid shaft, but some deformations of the shovel blade have

occurred. Unfortunately, several of the locking pins on the shaft and in the handle broke, rendering the entire shovel useless. The locking pins are obviously weak in the connection between the bolt and the spring.

Conclusion: The small blade size of this shovel limits the amount of snow that can be moved per scoop. The overall stiffness is good for cutting blocks; however, removing the blade from the shaft was difficult and required a lot of force. The T-shaped handle felt uncomfortable.



Despite its tough moniker, the Ortovox Grizzly cracked under the pressure of field testing. The serrated front blade edge, however, was given high marks for excellent cutting characteristics.

ORTOVOX GRIZZLY
Life's a Beach

Mechanical Characteristics and Stability: Unfortunately the Grizzly shovel did not live up to the strength implied by its name. The blade cracked where the ramp angle of the blade starts to change toward the shaft of the shovel, and the entire front of the shovel was heavily deformed. The large, flat platform on the upper end of the shovel is very effective when chopping blocks in the snow by stomping on the shovel with a boot.

Locking Mechanisms and Hoe Function: Attempts to lock the shovel in the two available positions weren't reliable, especially when the locking pin iced up. The shaft cannot be locked in the short length, which was particularly disappointing when working in close proximity to the buried subject. The hole which holds the locking bolt in place in the hoe working position quickly became ovalized, creating slop in the blade.

For general comments about the hoe function, see "Alternative angle blade – shaft" on page 17.

Snow Cutting: The serrated design of the leading edge of the shovel blade results in excellent cutting characteristics.

Conclusion: The concept of a shovel with an optional hoe position is promising, but many testers found this model tricky to handle while finding the proper locking positions. The lack of a short shaft working position is not optimal. The additional grip on the shaft is very aggressive even with gloves with a strong leather surface but still wore out remarkably quickly due to contact with the side of the ski boot when chopping snow.

Shovel Performances Span Heaven and Hell

Story, photos, and diagrams by Manuel Genswein and Ragnhild Eide

The publication of the V-shaped snow conveyor excavation strategy triggered many questions concerning the quality and efficiency of the working tools – in particular, the avalanche shovel. The following study focused on avalanche shovels that can be carried in a normal-sized backpack. Specialized rescue shovels with large steel blades used occasionally by organized rescue have not been taken into consideration. Plastic shovels were also not studied since they usually break in cold temperatures and hard debris before the first buried subject can be excavated. There are even some shoveling tools available without a shaft. These have not been taken into account due to the inefficiencies of their mechanical and/or ergonomic design.

Under the conditions of this research, shovels were tested while applying correct shoveling techniques. All testers were shown how to cut blocks and specifically instructed not to break up debris by leveraging handles with a lot of force. All failures and observations were seen during regular use of the shovels in avalanche rescue, the application they are primarily designed and sold for.

In addition to testing and rating a selection of products currently available on the market, this research aims to provide a detailed overview on the many important characteristics and functions of a shovel. The resulting criteria may be used as an evaluation guide for future products.

The manufacturers of the tested products were asked to comment on the test result for their product, which may be read at www.bergundsteigen.at.

This project was carried out by the authors Manuel Genswein and Ragnhild Eide under the patronage of The Austrian Alpine Club.

Avalanche Shovel Selection Criteria

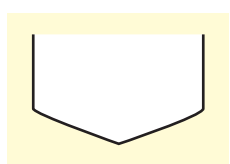
From all major manufacturers, only the one or two most promising (mechanically strong, ergonomic, lightweight) versions were selected for the test. Three each of the selected models were purchased in a regular mountain sports shop. In addition to a few heavier and larger versions weighing approximately 800 grams, we purposely selected a few lighter shovels in order to see if they can offer comparable properties/qualities as the larger versions. The lighter models were also an attractive choice for those who preferred plastic shovels.

Predominant Failure Patterns

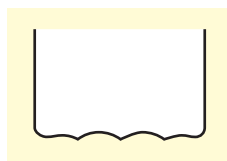
Most mechanical failures occurred while chopping blocks in hard debris. Blade deformations were often caused while jamming the shovel blade into the debris by stepping on the blade with a ski boot. When cutting into hard side walls, it was often not possible to cut into the debris by using the entire front of the blade. (Refer to diagram “how to properly cut blocks in hard debris”) By using only the corner of the blade, the same applied force is concentrated in a smaller area and therefore more effective. However, in several models, the blade could not withstand this mechanical stress, which led to irreversible deformations.

Important Characteristics and Features

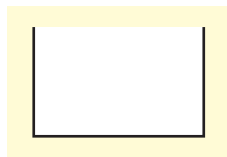
SHAPE OF THE BLADE—



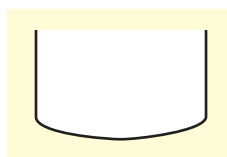
A triangular-shaped blade is offered by a few manufacturers. Theoretically the concentrated point of attack is advantageous when chopping hard debris. Unfortunately practice shows that in hard debris the triangular shape creates an unstable position that forces the blade to twist sideways. If the material could withstand the concentrated stress at the tip, or enhance a sideways attack with the blade, one could theoretically see this shape as an advantage. In practice, however, it has been shown that applying force across the full width of the blade while chopping snow leads to more efficient snow removal.



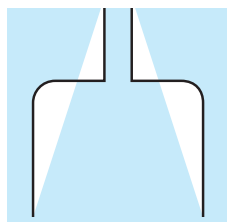
A serrated leading edge, with several exposed points of attack on a straight line, delivered the best cutting characteristics.



A straight front line of the blade provides a very stable leading edge of the shovel while chopping snow. The mechanical integrity of the main line of attack leads to the greatest blade durability.

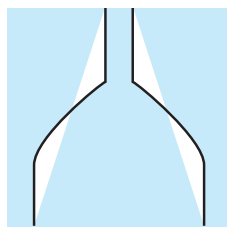


In general, rounded tips offer good characteristics for cutting snow, although the rounded shape can lead to some instability.



BLADE DESIGN—

A flat top provides a good platform for stepping on while pushing on the shovel from the back in hard debris.



When the top of the blade slopes to the sides at an angle, the boot simply slides off, preventing any energy from being transferred from the foot to the shovel. This wastes energy and discourages the shoveler.

BLADE RADIUS—

Small radiuses in the shape of the blade will lead to more mechanical stress being concentrated in those specific zones of the blade. Therefore, small radiuses are more vulnerable to deformation and eventually cracking.

BLADE SIZE—

Small blade sizes take less energy to wield, but make snow chopping and transport less efficient. In contrast, large-sized blades can move a lot of snow quickly, but require a very strong person.



A selection of Life's A Beach avalanche shovels, ready to build sand castles.

SHOVEL RATING CATEGORIES

HELLISH



Shovels that break and damage your equipment.

Shovels that belong in the *Hellish* category not only break, but also damage other equipment during regular use. Shovels with serious safety issues belong in this category as well.



Shovels that are likely to break before the first subject has been excavated.

Plastic shovels are often preferred for their light weight but are more likely to break in cold temperatures and on hard debris even before the first buried subject has been excavated. Furthermore, when plastic shovels do break, typically the entire tool becomes useless. Since there is no weight difference between plastic and the lightest metal shovels in the *All Mountain* category, plastic shovels should not even be considered.

LIFE'S A BEACH



Shovels in this category allow you to excavate one or two buried subjects in hard avalanche snow, but are not designed to withstand the stress an avalanche shovel is exposed to without being damaged.

After short use, these shovels show irreversible structural failures and need to be replaced. Considering the fact that the shovels of the *All Mountain* category are not more expensive – and some are actually cheaper – there is no justifiable reason to purchase a *Life's a Beach* shovel. These shovels will inevitably fail due to inferior properties of the metal.

ALL MOUNTAIN



All Mountain shovels are made for year-long use in avalanche rescue.

These shovels are neither heavier nor more expensive than shovels from the *Life's a Beach* or *Hellish* categories. Due to the use of durable, heat-treated alloys, these shovels do not suffer damage when chopping through hard debris.

HEAVENLY



Unfortunately, the perfect shovel has not yet been constructed.

See prototype of the solar-powered shovel with high-energy lithium batteries on next page...to be released in the near future.

Avalanche

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the Lull

Doug Krause searching for the threshold of acceptable risk. Cerro Entre Rios, Las Leñas, Argentina. Photo by David Dellamora

December 23, 2008 — Silverton, Colorado

It's stopped snowing and the wind is calm in town, but up high in the San Juans it's blowing a perfect 15 miles per hour and gusting to 30 at 240 degrees. This is the lull. We've received 5-10' of snow in the last week, and there is another two in the forecast.

Of course, now I've jinxed it. Colorado is plagued with a particularly angry layer of basal facets, and the most active avalanche cycle I've seen in the last couple of years drew to a close a few days ago. Now those paths that ran are reloading, and those that held tough are getting fatter and meaner.

I'm not doing much backcountry skiing lately. I'm lucky because I ski all summer, the in-bounds powder has been outstanding, and I'm just busy enough to keep me off of the hills when I'm not working. If those things weren't true, the only reason I'd have to not go backcountry skiing is that it's particularly dangerous right here, right now. That wouldn't be enough.

I'm a very experienced 37-year-old male intimately familiar with the local terrain and snowpack. I know that my favorite slope angles lie between 37 and 45 degrees, and my favorite snow is found during and immediately after storms. I enjoy challenges and sometimes ski by myself. I'm exactly the kind of person who dies in avalanches. If you are my mother, you must put this paper down immediately and never think of it again.

Exposure and avalanche hazards are things I deal with on a daily basis for most of the year, and my biggest fear is becoming complacent in their omnipresent shadows. It's hard to keep track of that threshold of acceptable risk when it keeps moving back and forth and blowing all over the place. It's pretty easy to trip over it and smash your face on a sliding block of reality.

I guess my threshold is lowest when I'm guiding non-mechanized clients deep in the backcountry; it's highest when I'm with trusted partners and we've just

Story by Doug Krause, continued on page 13 ➡

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I promise that I won't die in an avalanche this season.

—oath administered by Rod Newcomb during an Avalanche Awareness Night in Jackson, Wyoming. Story on page 27