Rescue Done Right

How to properly populate the prime real estate on your harness

By Reed Thörne

In a time when rope rescue practitioners have many choices concerning what to bring and what not to bring to a rope rescue incident, there is refreshing news. This news will no doubt come with some skepticism from those at the two extreme ends of the issue, which include 1) those who bring the proverbial "wheelbarrow" of gear to each incident and 2) those who tend to bring only the basics: rope, webbing, carabiners, pulleys and a few soft rope grabs.

Firefighters tend to roll up to a scene with more than they need because *they can,* due to the ability to transport the regulation-induced "wheelbarrow" to the incident; mountain rescue teams, on the other hand, think in terms of what they can do *without* because, oftentimes, they must carry everything back up the mountain. Hence, the average observer can instantly see why the former carries steel carabiners and ½" rope while the latter carries aluminum carabiners and 7⁄16" rope (as only one example).

So, in the face of this apparent dichotomy, is there something that just might be worthy of that valuable real estate on the rescue harness that would suit both groups mentioned above?

THE FOUR MAXIMS

There are four essential maxims for carrying a piece of equipment on your harness:

1. Keep it *simple*—Always default to the simplest common denominator to perform a given task. (*Note:* This should not be the case when training, as every team must be prepared for the worst.) One good example of this is putting a pulley on the harness. I always carry one or two. They're great friction-reduction items perfect for redirecting a pulling force or effort and definitely worth the space on the harness.
2. Keep it *efficient*—Ensure the system is going to make the best use of your efforts. Using the pulley again as an excellent example, you can invest in either inefficient or efficient models. Cost is the difference. Again, I choose the best bearing I can.
3. Keep it *non-specialized*—Use equipment ▶

PHOTO REED THORNE

Seattle Fire Department Ladder 7 practices a difficult and complex tandem high-directional tracking skate line evacuation in 2006 on Seattle Port cranes. In the urban/industrial setting, the modern-day edge kit, or AZTEK kit, provides a means of safe rappelling, ascending and belaying, which is extremely valuable to the rescuer endeavoring to make rapid patient contact. This photo actually shows multiple uses for the AZTEK; a total of nine kits were used during this drill. The "victim" is Keith Thörne, the author's son.

The less an item can be applied as a virtual panacea for all rigging situations, the farther back it should be placed on the list of things you must carry on your hip.

Line workers from Southern California Edison Company use the modern edge kit's contents, specifically the AZTEK set of fours, to transfer a mannequin across the top of an electrical transmission tower during training. Notice the equipment each worker carries on their harness. If you're going to carry things you think you need on your harness, make sure you can use them for multiple tasks.

PHOTO REED THORNE

that can multi-task and that's not specialized. Pulleys, again, are used in many different places in rescue operations.

4. Keep it *light/small*—Too much mass will slow you down. Go light, especially when the rescue location is above your arrival location. Even for firefighters performing bottom-up rescues (like on towers), having a light piece of equipment will save you energy as you climb.

What does all of this mean? If you're going to carry things you think you need on your harness, make sure you can use them for multiple tasks. The less an item can be applied as a virtual panacea for all rigging situations, the farther back it should be placed on the list of things you must carry on your hip.

I carry a certain amount of stuff that I feel is essential, but at the end of the day, I "triage" the things that I might consider carrying during the next rescue. More often than not, I end up with a few trusted, versatile items that I know will get me out of trouble in the end, one being the traditional edge kit.

THE EDGE KIT

The classic edge kit is used by many around the world, from firefighters to mountain rescuers and everyone in between. (I don't know where it was first developed, but it's a good idea whose day has certainly come.)

I was in Arizona back in the 1980s when I saw an edge kit for the first time, as it was being used by the Central Arizona Mountain Rescue Team. The kit included an 8- or 9-mm accessory cord that measured 50 feet in length and was flaked into a small hip bag on either side of the harness. The top end of the cord had a carabiner attached that could be clipped to an anchor. The cord was attached via a small moveable connection (prusik hitch) to the wearer's harness at the main attachment. This adjustable connection could be moved along and set at any number of lengths to allow the rescuer to secure themselves when entering an exposure or any location/elevation where there's a chance of falling. We borrowed a term from the fall protection/height safety industry and called the whole thing—the anchor, the cord, the adjustable attachment at the harness—a *travel restrict.* The cord fed out of the bag as required up to its total length. The cord could then be re-bagged as rescuers retreated from the edge.

In the late 1980s, I improved the traditional edge kit by adding a short Purcell prusik in between the accessory cord and the harness connection, replacing the simple prusik connection with one that absorbed energy. *Note:* A good length for a shorter Purcell prusik is about 18–24 inches; any longer than that and the prusik can move beyond the reach of the wearer. This addition was an improvement that opened up other possibilities for using prusiks in rescue.

At this point in its development, the edge kit was probably worth the real estate on a firefighter's harness

PHOTO REED THORNE

This photo shows four uses for the modern-day edge kit, or the AZTEK set of fours (SOF): 1) Guying of the high-directional gin pole used for getting rope and rescue package over a difficult spillway problem; 2) dynamic directional hanging from the gin pole head to move the main rope in and out; 3) the foot end of the SOF for the Arizona Litter Bridle; and 4) the attendant's adjustable connection to the litter yoke knot.

Omni AZTEK Set of Fours (SOF)

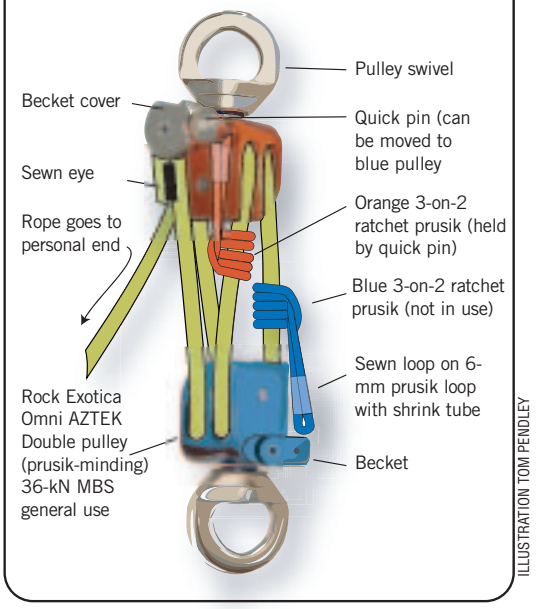

ILLUSTRATION TOM PENDLEY

AZTEK Personal Travel Restrict & SOF

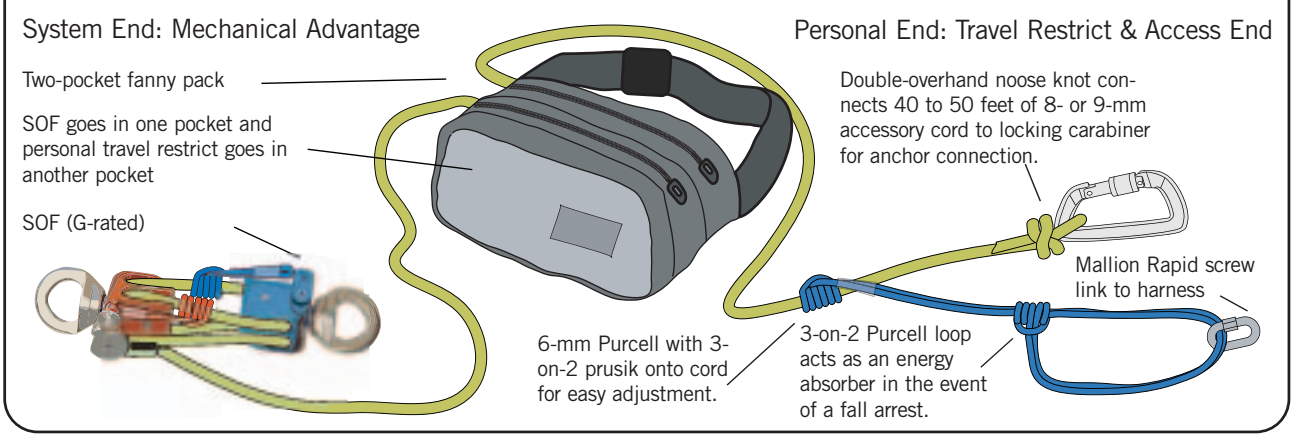

ILLUSTRATION TOM PENDLEY

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The No. 1 reason to carry an AZTEK: the travel restrict feature. Here, Mike Green of Montgomery County (Md.) Fire and Rescue works on a 500' high edge where rescuers constructed a highline that stretched from Courthouse Butte to Bell Rock in Sedona, Ariz.

if they were going to work on or near an edge, which rescuers must do in many cases. But if they just needed it as a travel restrict, it still seemed a little specialized. To fix this, we made even more changes in the years to come. We started using the kit to help us get into position when performing work within exposures, true belays, self-belays, single-part rappels and double-part rappels. These additional capabilities allowed us to gain rapid access to patients and treat them much quicker than before, plus they allowed us more mobility once in exposure, so we added the kit to our rescue "tool box."

All of these improvements developed quickly in the early 1990s at the Sedona Fire Technical Rescue Team (TRT) headquarters and simultaneously at the Ropes That Rescue school in the highlands of northern Arizona. By then, the edge kit had finally inched toward becoming a replacement for some of the items in the proverbial wheelbarrow. More importantly, we now were able to begin the rescue process *before* the wheelbarrow arrived, which was *huge* to us.

Another improvement was made in 2000, when I worked with Sterling Rope Company to produce the first sewn-loop Purcell. We constructed this Purcell with a "three-on-two" directional prusik hitch, which has the potential to slip in a fall but also has a release ability not found in its three-wrap cousin of traditional Purcells. We called this sewn-loop Purcell the *"Arizona Variation."* (*Historical note:* The first Purcells were invented by Arnor Larson of Rigging for Rescue in Invermere, British Columbia. The original Purcell prusik also came from British Columbia and was designed as a prusik hitch back onto its doubled self. If done properly, this hitch slips at a force that absorbs much of the energy of a fall. It can also be released under load since the prusik only has about half of the force applied).

At this point, there was no doubt about it; the edge kit had become a permanent fixture on the harnesses of the Sedona Fire TRT members. Early photos of the Sedona team abound with these crude bags on each firefighter/climber. After all, we were both a fire department rope rescue team *and* a well-accomplished mountain

Contents of the AZTEK Elite Kit

- 1 Rock Exotica Omni AZTEK Elite blue pulley
- 1 Rock Exotica Omni AZTEK Elite orange pulley with separate becket cover plate Quick pin
- 1 Sterling 8-mm or 9-mm AZTEK accessory cord with sewn eye on one end only (recommended length: 15.25 meters or 50 feet)
- 1 Sterling AZTEK orange ratchet
- 1 Sterling AZTEK blue ratchet

rescue team. The edge kit then served us well in all situations.

THE OTHER END

But what about the other end of that edge kit accessory cord, still laying in the bottom of the bag? I have to admit, it started to bother me because we never used it, so it was brand-spanking new for the most part when we inspected the kit on occasion.

As a lineman by trade (with engineering and construction at Southern California Edison Company) in the 1970s and just out of high school, I wondered about melding the disciplines of line work and rope rescue. After all, it seemed only logical.

Years later, as I worked on improving the edge kit, I lengthened the cord in the bag to accommodate a set of "blocks" (as linemen call them), or pulley systems, to do some lifting and cursory tasks in rescue. Linemen have different names for these small, jigger-type pulley systems, such as the "set of two blocks," "set of double blocks" but it was the term "set of fours" (SOF) that really stuck. Little did we know then, but this simple, yet versatile addition became a veritable treasure trove to our rescue methodology.

Now we had both ends of the edge kit in use, but there was one problem: We needed a bag to facilitate using both ends of the accessory cord. Eventually, a double-zipper model was developed so we could work out of both sides of the bag.

THE AZTEK KIT

The new double-ended kit needed a name, and living in Arizona meant the kit must certainly include the designation in the name, so the Arizona Technician's Edge Kit (AZTEK) was born.

The complete concept of the AZTEK kit

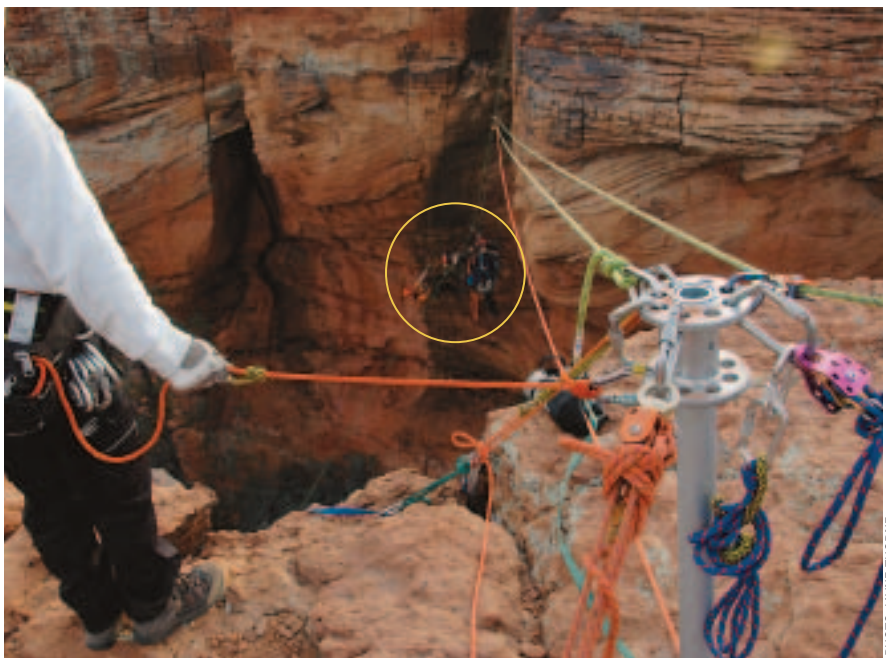

PHOTO JAYNE THORNE

Here, both ends of the AZTEK are used at the same time. 1) A small rigging pod with a compression member to elevate it above the edge beyond is being guyed with two separate AZTEKs. Note how the SOF is always tied off with a mule hitch before the operation. 2) The personal end of the AZTEK is used by a firefighter working near the edge. Note the Purcell travel restrict and double-zipper bag.

did not catch on right away. Initially, good friend and master rigger, Pat Rhodes (who worked for Ropes That Rescue at the time as an instructor) questioned the inclusion of a pre-rigged pulley system in the kit because it seemed contrary to Ropes That Rescue's paradigm of clean rigging from basics. No doubt, Pat had his arguments down, and I was hard pressed to counter them. But over time, as the AZTEK kit proved its worth, opposition faded; today, rope instructors teach the entire AZTEK system in courses around the globe. *Note:* Both the Purcell from British Columbia and the AZTEK from Arizona are historically accurate and inclusive of their respective origins. The terms should remain as is since it is well known that there is a lack of commonality in terms within rope rescue today. Certainly, it is noted that the edge kit on its own or the jigger pulley system on its own is no big deal (like the Purcell is a prusik back onto its doubled self) and not in need of a name. But the inclusion of the travel-restrict/fall-arresting feature and reverse reeve SOF included in *one* kit is noteworthy.

With the early AZTEK SOFs, we used any high-efficiency pulley we could get our hands on, and the blocks were reeved "reverse," again, like linemen do it, to prevent twisting while in use. Special pulleys were later designed in 2007 by Rock Exotica and myself and appropriately named the AZTEK Omni Blocks due to the introduction of a much-needed swivel at the top of each.

More than 100 uses for the full AZTEK have evolved since its inception, and rescuers now carry them regularly. Often, in a team of 12, each and every AZTEK is used in the rope system some place. Uses include the replacing of the BC or Radium Release Hitch at the tandem prusik belay to the guying of high-directionals like the Arizona Vortex Multipod (also developed at Ropes That Rescue).

Having this versatile tool on the harness also allows the rescuer to pass knots easily, correct disoriented equipment under load, transfer loads and establish dynamic fixed brakes. With the SOF as the pick-off unit for solo and semi-solo rescues, rescuers can select from multiple options, which allows for versatility, depending on all circumstances dictated by the particular rescue.

Dynamic fixed brakes (a fixed friction appliance/hitch in series with the SOF) and

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On the right, a brake tender in Biloela, Queensland, operates a "dynamic fixed brake" (where the brake rack is in series with the SOF) during industrial rope training in Australia. On the left, a precariously perched Arizona Vortex Multipod configured in the SA frame is being guyed by an AZTEK SOF in opposition to a handrail.

dynamic traveling brakes (a traveling friction appliance in series with the SOF) also add immeasurable versatility to the rescue system. In some instances, the personal end is used in tandem with the SOF end as a shock-absorbing lanyard, which provides added safety to the victim.

Remember the maxims regarding simplicity/efficiency when using equipment? The AZTEK's double end exemplifies this theme. Out of one zipper of a side pouch the rescuer is provided immediate edge protection, and from a second zipper of the same pouch the rescuer/rigger can deploy this mini MA (SOF) in a multitude of rigging applications, including hauling systems, tensioned back-ties, tensioned guying for artificial high directionals, dynamic traveling and fixed brakes.

VERTICAL TRANSPORT

Particularly in the urban/industrial setting, the AZTEK provides a means of safe rappelling, ascending and belaying, which is extremely valuable to the rescuer endeavoring to make rapid patient contact. A 9-mm rope is more than adequate for single-person rappels. A belay can easily be provided by a second AZTEK.

In addition to rappelling and ascending, the 5:1 (SOF) end of the extended AZTEK is the perfect primary attachment device for the high-angle litter attendant, allowing very rapid and easy vertical adjustments. By repositioning the 6-mm ratchet, the personal SOF can be transformed into a 4:1 change-of-direction scoop line for the foot end of the litter.

CONCLUSION

Rigging means carefully placed anchors whereby loads are either held in place and kept from moving or whereby loads are meant to be moved through a planned manipulation of tensile and compressive force using both friction and the application of tension when needed. As this definition indicates, when rescuers carry the components needed to lift, tension release and lower *on their harness,* they intrinsically have the ability to go about the business of rescue when they arrive on scene. Add to this the ability to fully and safely access the patient and remain tied off in an exposed area without using anything from the "wheelbarrow," and you have something worth the precious real estate on your harness. It is clear that the AZTEK affords a solutions-driven approach for the individual rescue practitioner.

Reed Thörne is director of the Ropes That Rescue school in Arizona and teaches vertical rope disciplines around the world. He is currently technical rope contributing editor for *Technical Rescue* magazine in the United Kingdom. Thörne is working on a fully illustrated book about rigging, which is gleaned from his years in the vertical realm that began with the line trades of the early 1970s.