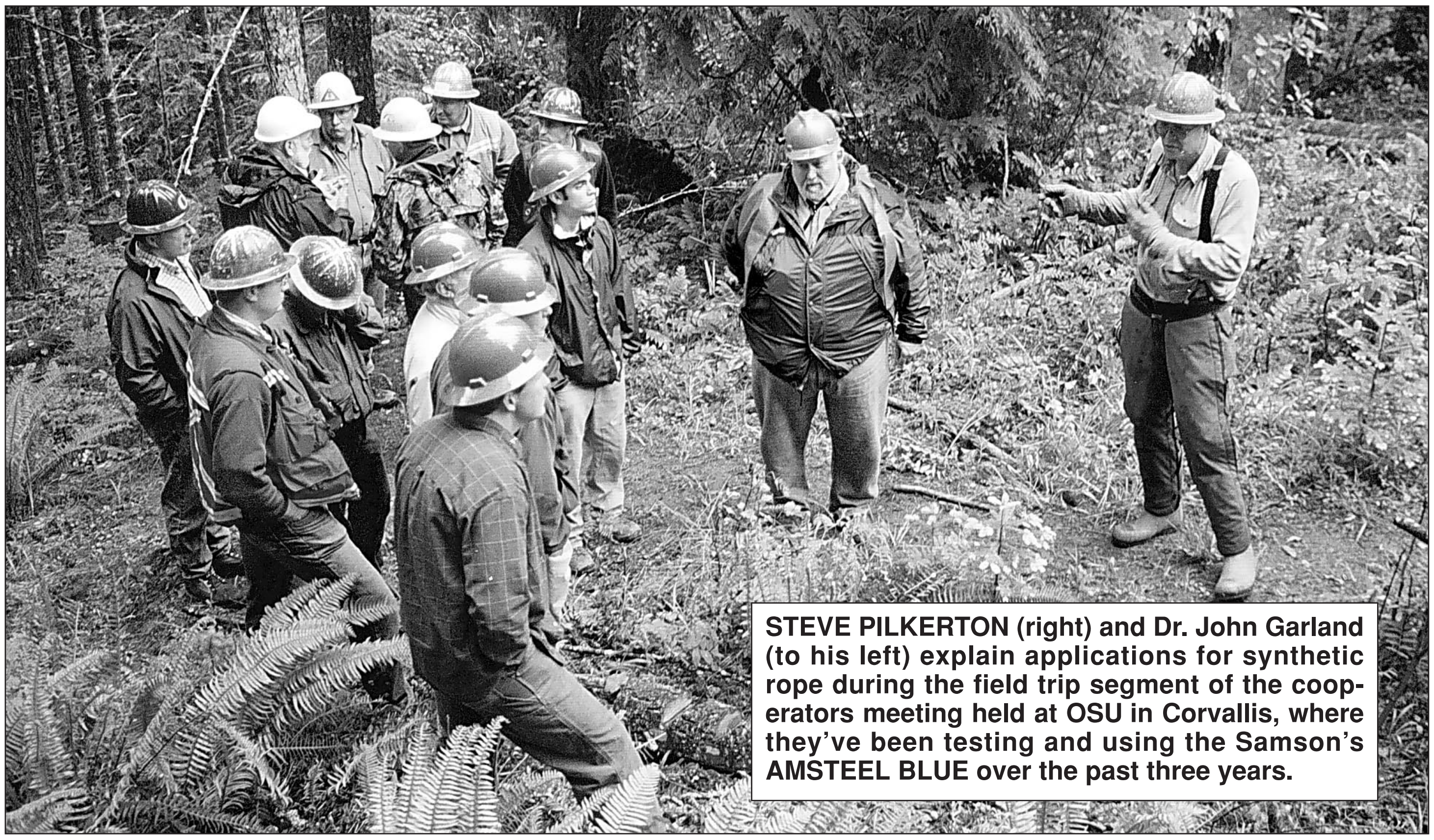
Synthetic rope looking very positive

Cooperator's share genuine enthusiasm over its advantages

By Mike Crouse



STEVE PILKERTON (right) and Dr. John Garland (to his left) explain applications for synthetic rope during the field trip segment of the cooperators meeting held at OSU in Corvallis, where they've been testing and using the Samson's AMSTEEL BLUE over the past three years.

We've watched with great interest as the testing continues on synthetic rope over the past three years of testing at Oregon State University (OSU), in Corvallis, Oregon. The promise of light weight, strength, characteristics similar to steel cable in terms of elasticity, have obvious benefits to anyone who's hauled, moved, or strung cable at any point in life. The object in all the testing is helping to anticipate what synthetic line can do in real life circumstances. That includes its physical characteristics, and capabilities, breaking strength, how much it stretches, etc. in addition to actual field trials for on the ground practical testing on what does and does not work.

We recently attending a Synthetic Rope Cooperators Meeting, comprised of loggers who have been involved in the testing and practical use of the synthetic rope in real life, field conditions. The group collected at Peavy Hall, home of OSU's School of Forestry, to compare experiences, talk with those involved in the research, and discuss other areas of further exploration, and how to address problems that may have surfaced.

First some review on the material being tested. AMSTEEL-BLUE manufactured by Samson Rope Technologies out of Ferndale, Washington (www.samsonrope.com). Certainly, there are other synthetic ropes on the market, however Samson Rope stepped up in the research and provided a lot of their own time, energy, and materials to this project.

First, the rope itself is ultra high molecular weight polyethylene (UHMWPE) fiber rope. The polyethylene fibers are combined to yarns and the yarns are combined into strands that are formed into various rope constructions including twisted, plaited, and braided. AMSTEEL-BLUE is a 12-strand braided rope. This synthetic rope has a higher breaking strength to weight ratio than steel, by a factor of 9 to 10. Other favorable characteristics include high flexibility, low stretch (other than the newly formed eye-splice), and a specific gravity less than one (floats), and can be easily spliced. Coatings can be applied to increase resistance to abrasion, prevent contamination, and increase ease of splicing used ropes.

The synthetic is generally the same material commonly used for fuel containers.

Weight difference

The most obvious plus of synthetic rope is the difference in weight. For a given diameter, steel wire rope is 7.5 (extra improved plow steel, EIPS) to 9 (swaged) times as heavy as a comparable length of AMSTEEL-BLUE rope (See Fig. 1). The synthetic rope is also flexible and does not produce "jaggers" (sharp, broken wires with-

(Continued on Page 31)
See "Synthetic Rope"

Synthetic Rope

(Continued from Page 30)

in a strand) as handling hazards common to wire rope. The cost is about four to six times that of wire rope in the specially produced quantities now available. The offshore drilling (anchoring) marine towing industries use similar synthetic ropes in applications parallel to logging.

The breaking strength of AMSTEEL vs. steel products is significantly higher than in previous synthetics as well (See Fig. 2). Comparisons between published breaking strengths for some common logging wire rope grades and constructions (EIPS and swaged) and those published for AMSTEEL-BLUE. At medium rope sizes (0.5-0.625 inch diameter), synthetic strength exceeds both EIPS and swaged wire

FIGURE ONE. Nominal breaking strength as a functino of rope weight for rope diameters 0.5-1.0 inches.

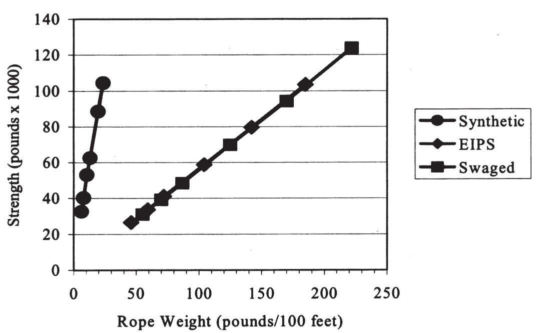
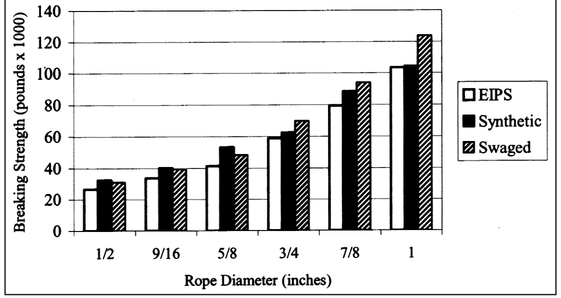


FIGURE 2. Ultimate breaking strengths of common diameter ropes used in logging applications: comparison of steel wire rope with AMSTEEEL-BLUE (UHMWPE) synthetic rope.



ropes. At larger diameters, the synthetic advantage diminishes to about equal EIPS strength at a 1-inch diameter. Rope elongation is also shown for AMSTEEL-BLUE under loads in Table 1 (on Page 8). These elongation values are an increase of 0.3 feet per 100 feet of rope length at loadings shown (an absolute percentage difference of 0.3 percent more than steel constructed ropes).

The testing protocols allow for a buried eye-splice as the end connectors for the test samples and the ropes nearly always break at the end of the splice. Thus, the reported ultimate rope strength is the strength of the eye-splice end connector You cannot use compression fittings on the synthetic ropes. Instead eye splices are called for. In tests, low temperature epoxies in poured sockets, tested for pulling strength, failed much below the strength of the rope. More tests with different epoxies are planned. (Check the article in Loggers World appearing in the March 2002 issue).

First part of the day we traveled to the OSU forest just outside Corvallis, which is used as an outdoor classroom as well as a working laboratory for the AMSTEEL-BLUE. Dr. John Garland, who headed the meeting, led the two vans out to the site where we met and heard from Steve Pilkerton whose involved in the day to day field work. They have a Kubota K-300 mounted on a Kubota M6950DT tractor, and a Koller carriage, which is used in their logging.

AMSTEEL in use as dropline on this motorized carriage.

Pilkerton explained, "...we have a 3/8ths mainline that's now fully synthetic." He elaborated, "One of the benefits right off in the design (of the Koller) was to spool about 1,100 feet, and we have almost 1,300 ft. of synthetic on the mainline drum and there's still flange space if we wanted to spool more. So getting maybe more capacity as some do with swedge line and additional strength at a smaller diameter that allows u to spool an equal amount or more."

They were also using synthetic lines for guylines, and to both guy and support intermediate supports... all accomplished with far less effort due to the weight and strength of the synthetic line. The same observation was repeated by other loggers

(Continued on Page 32)
See "Synthetic Rope"

INTERMEDIATE supports and supporting guylines using synthetic line... easier rigging.

Synthetic Rope

(Continued from Page 31)

involved in the testing... a single trip with all the line, down the hill to set up an intermediate support, as a huge improvement in time, effort, and energy, to say nothing of increased production.

Clamping lines down, and tying lines down, and terminations are all issues that most have figured out methods which work well in the woods, and are proving durable.

Once back in the classroom for the afternoon, all the applications which the AMSTEEL has been used in involving logging were presented followed by an open discussion on other approaches, and problem solving.

When all was said and done, the overall feeling from those loggers who've actually been involved with the AMSTEEL were enthusiastic, for all the above outlined reasons.

One of the applications, which will undergo testing this coming year, is using the material for log truck wrappers. "We think the synthetic wire wreappers has benefits," said one of the participants. "Huge benefits. Promising enough because we have elbow and shoulder injuries with steel wrappers, similar to (baseball) pitcher type injuries." As it stands, both Oregon and Washington have some issues on this material's use, as well as some interest. But implementation and consideration will require a change in the law, which may be forthcoming as well. Driver's who have used some of these wrappers to date were skeptical at first, until they'd used them a day or two, and would then not wish to surrender them.

More testing and field use is in the offing over the coming year. While the synthetic rope presently is a lot more expensive than steel rope, that is likely to change if the material becomes widely adopted, and in greater supply. The real question, assuming all other issues of practicality are understood, is what will this new material do in terms of production, speed of setups, and ease of use, these benefits outweigh the costs. At least early on, those who use it are very optimistic, to the point of relying on the material day to day, and learning as they go.

What we'd hope would result in the very near future, is a user's guide of methods that work in the field. And perhaps most interesting of all will be seeing the synthetic rope in regular use by loggers in the field, whose record of innovation can only be tapped when they have access to the rope's use with the requirements of the day. It should be very interesting to watch.

AMSTEEL synthetic line being used as a winch line in Éastern Oregon. The line is susceptible to being cut by sharp edges, but smoothing out sharp edges took care of the problem.