

# FIREHOUSE®

## Weekly Drill

### DRILL #101: ROPES & KNOTS: PART 2

#### Introduction

In Part 1 of this three-part series (Weekly Drill #98), we examined the different materials being used in the manufacturing of fire service ropes. In Part 2, we are going to review some the construction features associated with the rope we use.

With natural fiber material ropes, the process involved utilizing the laid (twisted) method of construction. However, with more synthetic materials being used in today's ropes, a variety of methods are being used in the construction and fabrication of the rope.

The laid or twisted method is the more commonly used method for fabricating natural material ropes. Additionally, this same process is used with synthetic materials; however, this is not the only method used for synthetic materials, and in general, is not the fabrication feature we should be using for rescue rope. The process used in laid rope fabrication is to twist the fibers together to form a strand. The strands are then twisted together to form the rope. Laid rope has its flaws, as every strand leaves the fibers exposed to damage.

Braiding is another method used to construct rope and largely with the synthetic materials. The method used in braiding is to weave the fibers together. In weaving these fibers together they become very smooth to the touch and are quite flexible, making them easier to manipulate. As in the laid method, braiding exposes the fibers to damage as well.

Braid-on-braid is the next method and like the name indicates, in addition to the main braid a braided sheath is attached over it. With this braid-on-braid construction, the total strength of the rope is divided between the main braid and the braided sheath. This method of construction allows the rope to be more dynamic or stretchy.

The final method used to construct rope is known as Kernmantle. With this type construction the rope is divided into two sections: the core, or kern portion, and the covering, or mantle. Unlike the braid-on-braid constructed rope that divides the total strength, the Kernmantle is designed to have the kern or core



section carry the majority of the load. For all intents and purposes, the core section will support 75 percent of the strength with the covering supporting the remaining 25 percent.

Another feature of the Kernmantle rope is that it can be either dynamic or static, depending on the configuration of the fibers being used in the kern. Should the fibers be twisted together and the mantle around it be woven, the results will generate a dynamic rope. On the other hand, should the kern fibers run parallel to each other with the mantle woven over them, the end product will be a static rope.

*—Prepared by Russell Merrick*