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Fire Sculptures Using FireRope

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Fire sculptures are not a true pyrotechnic effect, being produced simply by the burning of a liquid fuel in air. Nonetheless their use can contribute rather nicely to firework displays that include ground effects. Fire sculptures form continuous images in yellow fire that burn for 10 minutes or more. This is in contrast to lance work images, created using a series of points of variously colored fire that burn for about a minute.[1] As with lance work, it is probably more common for fire sculptures to form images of objects, ships or buildings, than lettering such as in the (self-serving) example below.

Fire sculptures, while relatively common in England[2] and Australia, are virtually unknown in the U.S. Presumably this reflects more of a difference in heritage rather than taste. However, perhaps another reason is the general unavailability of effective materials with which to assemble fire sculptures. One convenient material is called FireRope, a product that makes fire sculptures quite easy to produce. (Advanced Pyrotechnics, the Australian manufacturer of FireRope, is apparently seeking to export FireRope to the U.S.[3])

FireRope is available in 50-meter (160-foot) coils, is approximately one inch in diameter, and is made mostly of compressed absorbent paper. It holds its shape because of a central wire for stiffening, and it has an external wrap of strong thread to hold it together. In addition to its normal configuration, it is also available with an outer sleeve of thin plastic. This provides a significant degree of weather protection while also acting to retard loss of liquid fuel by evaporation during the time prior to its firing.

The thin plastic sleeve proved quite effective for the example shown in Figure 1. The fire sculpture was erected on a sunny and pleasant November afternoon. However, because of the unpredictability of late fall weather in western Colorado, it was constructed using the plastic sleeved FireRope. This proved to be a good thing, because before it could be fueled and ignited that same evening, a heavy wet snow started to fall. After two days, the weather cleared and the now solidly frozen snow could simply be broken off leaving the fire sculpture in perfect condition.

Fire sculptures are made by simply forming the FireRope into the shape of the image to be created (in this case, forming the letters for "JPyro", the abbreviation of the Journal of Pyrotechnics) and attaching them to a fire resistant

Figure 1. An example of a fire sculpture using FireRope.

frame. This is conveniently accomplished using the same twist ties often used to close plastic bags. Prior to igniting, the FireRope is thoroughly soaked with fuel, typically diesel fuel or kerosene. For the 1-½ by 4-foot "JPyro" example, the 1-½ quarts of fuel was quickly loaded into the plastic sleeving of the FireRope from used (empty) mustard dispensers. In cases where the non-sleeved FireRope is used the fuel can be applied directly to the FireRope, using a suitably sized dispenser.

Using diesel fuel or kerosene obviously produces an opaque yellow flame. However, one experiment was conducted using methanol applied to non-sleeved FireRope, to determine whether a mostly colorless (transparent light blue) flame would be produced. During the early period of the burning, the flame was sufficiently colorless to suggest that a suitable colorant could be added to produce a non-yellow colored flame.[4] However, the duration of the flame effect was only about 5 minutes and, when the methanol was mostly consumed, the flame gradually turned increasingly yellow.

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References

1) B. J. and K. L. Kosanke, "Lance Work: Pictures in Fire", *Pyrotechnica*, No. XV, 1993; also in *Selected Pyrotechnic Publications of K. L. and B. J. Kosanke, Part 3 (1993 and 1994)*, Journal of Pyrotechnics, 1996.

2) Various articles appearing in *Fireworks* mention the use of fire sculptures; Issue 36, p 10; Issue 29, p 16; Issue 25, p 6; Issue 24, pp 9 and 38; Issue 23, p 22; and Issue 17, p 24.

3) Jack Moeller, Advanced Pyrotechnics, 3/21 Church St., Abbotsford, Victoria, Australia; e-mail address, pyrohead@onthe.net.au.

4) C. Jennings-White and S. Wilson, "Lithium, Boron and Calcium", *Pyrotechnica*, No. XVII, 1997.