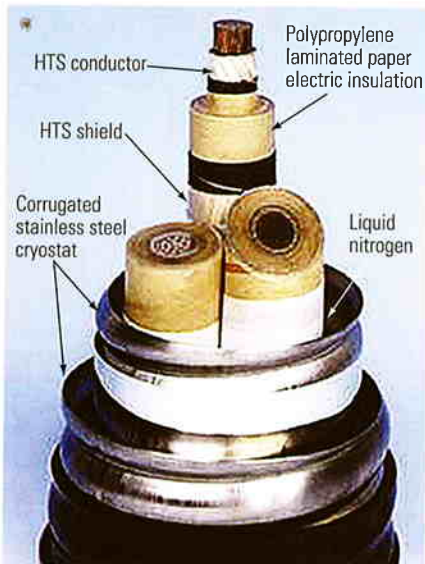


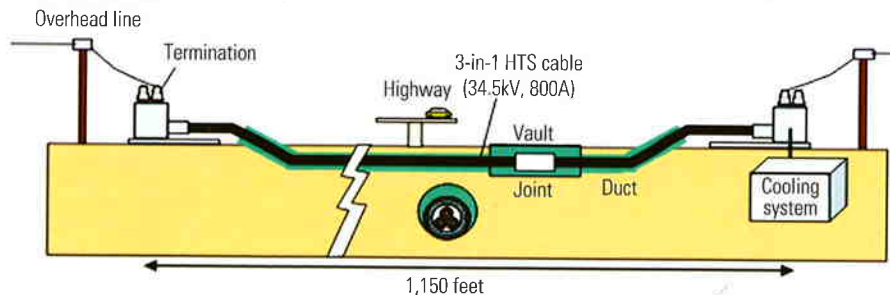
GLOBAL MONITOR

Consult the *Guinness Book of World Records* if you want to know which monster truck has made the highest jump ("Bigfoot 14"—24 feet) or the length of the longest freight train ever (a 4.5-mile string of 682 ore cars). But only POWER can "certify" claims for being the first, fastest, or biggest in the world of electric power. After vetting an unusual number of such claims received last month, we present for your consideration a short list of those that passed muster.

1. Super cable. This high-temperature superconducting (HTS) cable combines all three cores (one per phase) into a single, liquid nitrogen-cooled cryostat. The structure reduces cable diameter and heat invasion. *Source: Sumitomo Electric Industries Ltd.*



2. Out of sight. The superconducting cable links two National Grid substations in Albany, N.Y. *Source: SuperPower Inc.*



First live superconducting cable

The world's first in-grid superconducting power cable was energized in Albany, N.Y., on July 20. The 1,150-foot-long underground cable—intended to demonstrate that high-temperature superconducting (HTS) wire can improve electricity transmission and distribution by integrating all three phases into a single cryostat—operates at 34,500 volts, with a nominal carrying capacity of 800 amperes (Figure 1). The cable was developed by SuperPower Inc. (www.superpower-inc.com), a subsidiary of Intermagnetics General Corp, and its partners Sumitomo Electric Industries Ltd. (www.sei.co.jp) and BOC Group, which merged with Linde Groupe (www.linde.com) this August. It links the Riverside and Menands substations of the North Albany Service Center of National Grid USA (www.nationalgridus.com) via a standard utility underground right-of-way (Figure 2).

The cable now in use in Albany uses first-generation HTS wire, but about a year from now a portion of it will be replaced by second-generation conductor to demonstrate the successor's viability. According to SuperPower, the "2G" HTS wire (which can handle more than 100 times as much current as a conventional copper wire) should be less costly to manufacture than its predecessor, so it should become commercially viable sooner. The key to the cable's efficiency is the use of liquid nitrogen to cool it to minus 328F, about 70 degrees above absolute zero (Figure 3).

"Use of HTS cables has the potential for enormous impact on consumers and the utility industry," said Philip J. Pellegrino, president of SuperPower. "Congestion on electricity highways has become a major problem. HTS technology enables transmission and distribution of power through cables that are much smaller than comparably rated conventional copper conduits—a big plus in space-constrained urban areas."

The first-generation cable that was energized

3. The terminator. Cable terminations to the existing grid are made through a stainless steel cryogenic vessel. The building behind it houses the refrigeration system and a back-up tank of liquid nitrogen. *Courtesy: SuperPower Inc.*



this July uses HTS wire made of compounds of bismuth, strontium, calcium, copper, and oxygen; it will be operated for about a year. Simultaneously, the developers will set the stage for installation of a 100-foot section of cable containing more than 6 miles of the second-generation wire, built from compounds of yttrium, barium, and copper oxide. Subsequent testing will seek to verify that the inserted 2G segment improves overall cable performance.

The \$27 million cost of the program is being shared by the project partners (\$7.5 million), the New York State Energy Research & Development Authority (\$6 million) and the U.S. Department of Energy (\$13.5 million). Although this isn't the first time the DOE has underwritten half the cost of such an important project, the department deserves kudos for spending taxpayer dollars wisely on this one.

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