

OLL IN THE REPUBLIC OF KOREA

cooling features were required.

Transformers generate a lot of heat, and every transformer has a thermal limitation. Push a transformer beyond its thermal limit and conventional insulation components start to deteriorate. Typical insulation materials in liquid-filled transformers are mineral oil and cellulose paper products.

The engineers at Hyundai realized that in developing a mobile transformer that met their specifications, a key variable would be the thermal capacity and weight of the insulation system. Other South Korean companies that had tried to build mobile transformers found they couldn't achieve more than a 23MVA capacity without exceeding the highway weight limitation.

A solution suggested itself when the Hyundai team attended a 1992 seminar hosted by DuPont Korea. The seminar was devoted to Nomex® brand insulation. The Hyundai engineers learned that Nomex® paper and pressboard were already used in various electrical applications around the world, including mobile transformers in the United States. It occurred to them that the greater efficiency per unit of weight of Nomex® paper might provide the solution for their transformer.

Deciding to go with Nomex® insulation was a gamble for Hyundai. The manufacturing giant did not have experience working with Nomex® paper and did not have the research capability to explore materials of Nomex® thoroughly. Nomex® papers also cost more than cellulose.

The company hedged its bet by forging a relationship with DuPont for technical support. They drew on the help of a team of experts led by Richard L. Provost at DuPont in the United States, a recognized expert in the field. Transformer design analysis was provided by the team's power engineering specialist, Bob Whearty, who used a computerized design program.

The result was the development by Hyundai of a new liquid-filled 40MVA mobile transformer that uses a "hybrid" insulation system incorporating both Nomex® components and cellulose components.

The Nomex® materials are used in hottest areas: the



wrap around the transformer's conductors, pressboard spacers separating the coil windings, and the longitudinal "sticks" to which the spacers are attached. As the distance increases away from the conductor, temperatures get lower within the transformer "box" and do not require the use of Nomex® insulation. In those parts of the transformer, cellulose is used — hence a "hybrid" system.

And what started out as a seminar contact has grown into a solid working relationship between Hyundai and DuPont. These days Dick Provost and John Jo, marketing manager for DuPont Korea, visit Hyundai three or four times a year. With the 40MVA mobile transformer success behind them, Hyundai and DuPont are planning even larger capacity substation transformers (over 60MVA). The companies are also investigating the development of traction transformers for high speed trains. Such developments would represent a major quality improvement for South Korea's electrical power industry.

Meanwhile, the 40MVA mobile transformer is a noteworthy achievement in and of itself. It weighs 39.5 tons including tractor and trailer for transportation, and it is sufficient to supply electricity to a small city with a population of 200,000. Hyundai's hot little transformer means cooler summers and dependable electricity for people throughout South Korea. ■

When South Korean temperatures rise, Hyundai's new mobile transformer with Nomex® brand insulation can ease to the rescue of power-starved regions without violating highway weight restrictions.

The development of smaller, lighter mobile transformers was a collaborative effort between Hyundai Heavy Industry (HHI) and DuPont Korea (DKI) led by (left to right): H. P. Kim (HHI), M. H. Shin (DKI), J. H. Jo (DKI), Y. N. Kang (HHI) and G. C. Lee (HHI).

NOMEX® brand insulation

Providing Future Solutions Today

NOMEX® brand insulation is used in many applications in addition to mobile transformers such as traction and industrial transformers, dry-type transformers (including resin cast), and in transformer repair. Case histories are available describing the many applications.

For more information, contact your local DuPont representative, or one of these regional contacts:

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