HIGH VOLTAGE LAB SPARKS INTEREST ON DIRECT CURRENT TESTING

Kinectrics has opened a new facility to provide DC testing services with particular capabilities for DC arc hazard testing that have never before been available to the power industry.

Kinectrics purchased laboratory equipment and created an original technical design for DC arc testing that is exclusive to its High Current Laboratory. "We made something simple and practical that can do the job," said senior Kinectrics engineer Carl Keyes, of the service.

With this new facility, Kinectrics has expanded to handle the full spectrum of both AC and DC arc testing. Further, with a long established background in comprehensive AC testing, Kinectrics has unique expertise in the controlling and measuring of electrical arcs to produce data that can be used to quantify the associated hazards.

"That is the special ability we bring to this work," emphasizes Keyes. The similar lab set-ups used for both DC and AC arc testing also provide the opportunity to apply cross-correlations and establish quantifiable differences related to test data.

"The equipment is working well. With this addition to our high current test facilities, we now have the flexibility of performing a wide variety of high current DC testing at low voltages (below 700 VDC)," says Keyes. "We can also perform high current 3-phase AC testing over a range of source voltages below 700 VAC. Kinectrics' additional strength is in accurately measuring arc radiant energy using our high speed calorimeters and digital data acquisition equipment."

Bruce Power has promoted the development of DC Arc testing at Kinectrics. They recognized the need for improved capabilities in the industry and initiated the project in this area. In parallel, the IEEE has formed a committee to raise funding for arc testing in general, including further DC arc testing.

Injuries due to burns from the radiated energy of DC arcs are a serious safety concern. Examples of specific DC arc hazard locations include: battery banks in transmission and generation stations and transit power rails that utilize DC current. Kinectrics' purpose in expanding its test capability is to facilitate the gathering of new knowledge on arc hazards to aid in the selection of appropriate personal protective clothing and equipment. "It's all about safety," adds Steve Cress, principal engineer and Kinectrics T&D Department Manager, noting that "industry studies have found that the majority of deaths in electricity-related incidents have been due to burns".

The initial demonstration was carried out at Kinectrics on February 2, 2007. The session was attended by several representatives from the IEEE, Bruce Power and the CANDU Owners Group (COG). The IEEE reps who attended the initial demo were very impressed with the results and remarked that now in the 21st century, "the industry is finally starting to acquire knowledge" in the important area of DC arc hazards.

Kinectrics' DC testing capability was developed rigorously over a six month period. "We took baby steps," says Keyes, "in gradually increasing the current in the trial runs." The system is modular and can be operated in parallel for higher capacity. When fully assembled, the DC test equipment will deliver a maximum of 30,000 amps and up to 800 volts.

"We will analyze the resulting data from a matrix of tests with varied parameters, in order to approximate real-world conditions," said Keyes.

These are photos of only one of the two rectifier units (each is rated at 12,000 A DC continuous). Placing the two rectifiers in parallel, short bursts of up to about 30,000 A DC can be achieved. Both the epoxy encapsulated transformer and rectifiers are water cooled.