

Association of Professional Engineers

of the

Province of Manitoba

Certificate of Engineering Achievement

to

MANITOBA HVDC RESEARCH CENTRE

for

THE REAL-TIME DIGITAL SIMULATOR

The Certificate of Engineering Achievement is awarded to the Manitoba HVDC Research Centre for the Real-Time Digital Simulator.

The design of electric-power systems involves the simulation of high-speed electrical and magnetic behaviour of generation and transmission equipment. Traditionally, this has been achieved by building scaled-down equivalent or analog simulators which are expensive to build, maintain and operate.

The idea of a digital real-time simulator was proposed in the early 1980's. Because the simulation of electric power systems involves complex solution methods to highly non-linear problems, it was totally impractical to use available processors and solution techniques for real-time simulations at the time. However, work at Manitoba Hydro on simulation algorithms, at the Manitoba HVDC Research Centre on parallel digital signal processors and at the University of Manitoba on modelling techniques led to the first successful demonstration of real-time digital simulation in 1986.

The Real-Time Digital Simulator (RTDS) is the first and only fully digital real-time electromagnetic transient simulator in commercial operation. An RTDS system may consist of over 200 high speed digital processors with a calculation speed of about five gigaflops (billions of floating-point operations per second). A sophisticated graphical user interface allows users to set up studies quickly and to view and document results easily. Thus the productivity of a digital simulator is higher than that of an analog simulator, which may cost five times as much. Because an RTDS system is transportable, RTDS systems have been used with operating power system equipment which would not have been possible with an analog simulator.

A paper dealing with the use of RTDS for the testing of protective relays received a 1993 Institute of Electrical and Electronics Engineers prize paper award.

The parallel processor supercomputer, the advanced software and the graphical user interface have made the Real-Time Digital Simulator a success that is recognized by the electric power utility industry worldwide. Seven RTDS systems have been shipped to customers in Canada, Japan, Sweden and the United Kingdom, and additional orders have been received.

March 10, 1994