

P1409 CUSTOM POWER TASK FORCE

TF 15.06.05.01

Meeting Minutes

**IEEE PES 1996 Summer Meeting, Denver, Colorado
Tuesday, July 30, 1996, 3:00 - 4:30 PM
Vail Conference Room**

A meeting of the Custom Power Task Force was held prior to the Distribution Voltage Quality Working Group meeting at the 1996 Summer Power Meeting in Denver. The meeting was chaired by Dan Sabin, filling in for Harshad Mehta.

Introductions

Although no introductions were made, 57 people still signed the attendance list, a summary of which is attached. Attendees were asked to update their addresses, phone numbers, etc., on the membership list passed around. The updated membership list is also attached.

The membership list also now shows status within the group. Any members who have not attended any of the last three meetings nor have contacted the task force secretary about changing status to "correspondence member" are considered inactive and are listed on the sheet as "registered guests."

| Membership Status | Count |
|--------------------------|--------------|
| Members | 67 |
| Correspondence Members | 8 |
| Registered Guests | 62 |

Minutes from Baltimore

The prepared for the last meeting of the task force at the IEEE PES 1996 Winter Meeting in Baltimore were prepared and presented by Dan Sabin.

Chairman's Report

Although Harshad could be present for the meeting because of a sudden illness, he still had some comments for the progress of the task force and custom power technology over the past six months.

Harshad felt that work should be begun in earnest on the task force guide by chairmen assigned to write each chapter. Soon after that work is begun in earnest, the guide book should be completed.

Custom Power Technology Development List

A continuing goal of the Custom Power Task Force will be to centralize information concerning the development of custom power technology and the installation of devices which utilize this technology.

Note that this is an "application-oriented" listing of projects. With these new technologies, companies are very reluctant to apply them until there is some field experience. Sharing of information about applications helps to generate acceptance for the technologies in the marketplace, identifies benefits and potential problems with the technologies in specific applications, and helps identify areas for future technology improvements. All of these are important overall benefits that can be achieved without the sharing of proprietary information about particular products and technologies.

A similar approach has been used for years in the HVDC Subcommittee and its associated working groups (more recently expanded to include FACTS technologies). The HVDC groups published a number of papers and bibliographies that documented HVDC installations around the world, helped develop guidelines for equipment specifications, and significantly enhanced the visibility of these new technologies in the marketplace. These are the kind of objectives that we would like to accomplish with the activities of the Custom Power Task Force.

The following sections present the names of utilities and universities currently performing custom power device testing and installations.

Baltimore Gas & Electric

Testing a medium voltage subcycle transfer switch at downtown office

Cinergy Corporation

Testing of 15 kV, 600 A solid state fast transfer switch

Clemson University

Development of input/output objectives for series compensation devices

Commonwealth Edison

Testing a transfer switch

Detroit Edison

Will receive a 15kV, 600 A sub-cycle solid state transfer switch for installation at an industrial customer's facility in late August 1996.

Duke Power Company

A series compensation device was placed on-line carrying critical customer plant load in late August 1996 on the Duke Power Company system in Anderson, South Carolina. The device is going through commissioning is now in service at Orian Rug Company where the unit is to protecting the automated yarn manufacturing and weaving plant from voltage sags and disturbances coming from the Duke Power distribution system that serves the plant. The unit carries approximately 120 amps at 7.62kV line to neutral voltage.

Florida Power Corporation

A series compensation device is installed at the FPC 230/12.5 kV, 100 MVA Econ substation in Orlando where it protects one of the six 12.5-kV feeders. The project is designed to demonstrate of the ability of the DVR to provide improved feeder power quality in a high isokeraunic environment. Power quality measurements of the Econ feeder data will be compared with the unprotected feeders.

Hydro-Québec

Hydro-Québec is currently doing simulation on the application of Custom Power Devices on its network. Also, a feasibility study on solid state tap-changer is being done. In 1997, they will study custom power parks. Hydro-Québec is not planning to install custom power devices until 1998.

Pacific Gas & Electric

Installing its first static transfer switch at a commercial customer's expense. It is rated at 25 kV, 300 A.

Powercor Australia, Ltd.

A 50 Hz series compensation device is being commissioned at the Bonlac Foods plant at Stanhope, Victoria, in Australia where it will protect the sensitive dairy food process plant load from disturbances originating on the Powercor Australia 22-kV overhead rural distribution system. The Bonlac plant produces powdered milk and other related dairy products from milk supplied by nearly 800 dairy farms in the area.

Public Service Electric & Gas

A 50 Hz dynamic voltage restorer is being commissioned at the Bonlac Foods plant at Stanhope, Victoria, in Australia where it will protect the sensitive dairy food process plant load from disturbances originating on the Powercor Australia 22-kV overhead rural distribution system. The Bonlac plant produces powdered milk and other related dairy products from milk supplied by nearly 800 dairy farms in the area.

Public Service Electric & Gas

PSE&G has been involved in a number of custom power projects, including:

- 150 kVA advanced power line conditioner
- solid state breaker
- series compensation device
- pole-mounted advanced static var compensator

PSE&G also has each of the devices, except the last, in place and operational.

Technical Presentations

Two technical presentations were made at the task force meeting.

Input/Output Requirements of a Series Compensation Device

Randy Collins, Clemson University

The first presentation introduced important topics which are crucial to the task force guide book's chapter on "Input/Output Requirements," focusing on the effect of waveshape and phase shift on the quantification of voltage sags. The presentation stressed the differences between the computation of rms for transient waveform analysis versus a "missing voltage" technique. Both hypothetical and experimental examples were provided to illustrate the importance of being aware of the needs to compensate disturbances with and without phase shift. The phase shift which is not uncommon at the inception of a fault can boost the voltage compensation requirements of a series compensation device. The maximum compensation requirements can vary from 1.0 per unit with no phase shift to 2.0 per unit, assuming a 180° phase shift.

EPRI Custom Power Products

Dave Richardson, Electric Power Research Institute

The second technical presentation of the afternoon was a summary of the applications of custom power for which EPRI is currently performing research and development. These applications include both series and shunt compensation devices that are meant to solve power quality problems. The series-connected devices are based on PWM-inverter technology and are prescribed to alleviate problems attributable to the utility distribution system, while the shunt-connected devices can protect the power system from "dirty loads." Both types of devices are designed to provide large-scale uninterruptible power if coupled with sufficient capacitive storage. Research is also underway into solid-state transfer switches with specifications of 15 kV, 600 A. A pole-mounted series compensation device is now also under development.

Chapter Chair Reports

No presentations were made by the task force guide book chapter chairmen present. However, the chapters and their authors are:

| Chapter Title | Chapter Author |
|------------------------------|--|
| 1. Definitions | Neil Woodley, Westinghouse Corporation |
| 2. General Needs | Dan Sabin, Electrotek Concepts, Inc. |
| 3. Configurations/Objectives | Neil Woodley, Westinghouse Corporation |
| 4. Input/Output | Larry Morgan / Stephen Middlekauff, Duke Power Company |
| 5. Performance Measurements | Mark McGranaghan, Electrotek Concepts, Inc. |
| 6. Case Studies | Ashok Sundaram, Electric Power Research Institute |
| 7. Engineering Issues | Paul Stecuik, Power Technologies, Inc. |
| 8. Bibliography | Vladi Basch, Baltimore Gas & Electric |

New Business

No new business was undertaken at the task force meeting.

Chairman's Absence

Discussion was held regarding the unexplained absence of the chair, Harshad Mehta, from the task force meeting. It was learned immediately following the meeting that Harshad was in fact no present because of a sudden and serious illness that prevented him from traveling to Denver the night before. Efforts were made by Harshad to contact a number of people attending the meeting, but unfortunately, his voice mail messages were not received by these people until after the meeting.

Panel Session at the 1996 IEEE PES T&D Conference and Exposition

A panel session was held at 1996 IEEE PES Transmission and Distribution Conference and Exposition, held on September 16, 1996, in Los Angeles. Entitled, "Custom Power Applications for Power Quality Improvement," the panel session was chaired by Harshad Mehta of Silicon Power Networks. The panelists represented a cross-section of the electric power industry. Their presentations focused on important research and implementation of custom power technologies being completed today. The panelists and their presentations were:

What is Custom Power?

Ashok Sundaram, Electric Power Research Institute

High Power Electronic Building Blocks

Rik De Donker, Silicon Power Corporation

Using Custom Power Technology for a Premium Power Quality Service

Robert Gilleskie, San Diego Gas & Electric

Power Electronics Implementation of Custom Power Applications

Neil Woodley, Westinghouse Electric Corporation

Input/Output Requirements for Series Compensation Related Power Solutions

Stephen Middlekauff, Duke Power Company

Action Items

| Action | To be completed by: |
|---|----------------------------|
| 1. Submit revised PAR | Task Force Secretary |
| 2. Chapter chairman to have written detailed sections and delivered to the task force secretary within 90 days of the winter 1997 meeting | Guidebook Chapter Chairmen |
| 3. Organize Custom Power Panel Session for IEEE T&D Conference in Los Angeles | Task Force Secretary |

*The *Guidebook Chairmen* are Neil Woodley, Dan Sabin, Larry Morgan, Stephen Middlekauff, Mark McGranaghan, Ashok Sundaram, Paul Stecuik, Vladi Basch, and Ram Mukherji

Next Meeting

The next meeting of the Custom Power Task Force will be at the IEEE PES Winter Power Meeting in New York, New York, on Tuesday, February 4, 1997.

Attachments

Meeting Agenda, Custom Power Task Force Summer 1996 Meeting
 Meeting Attendance, Custom Power Task Force Summer 1996 Meeting
 Most recent membership list for the Custom Power Task Force

Minutes Submitted by:

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 Task Force Secretary

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