



Presented by Tri Tran - Convener

Brisbane 21/11/2019



cigre

For power system expertise

A1

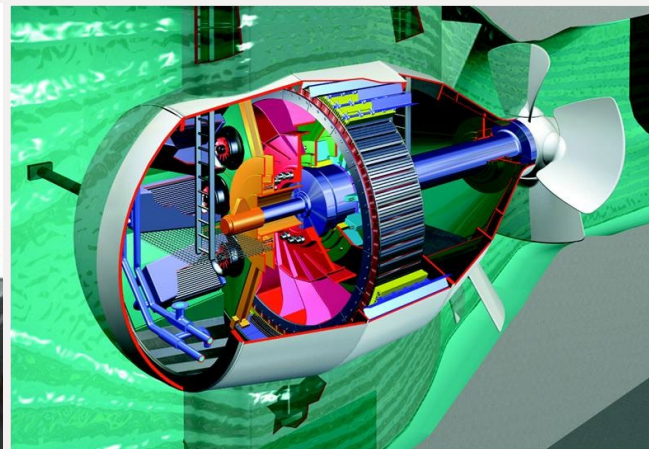
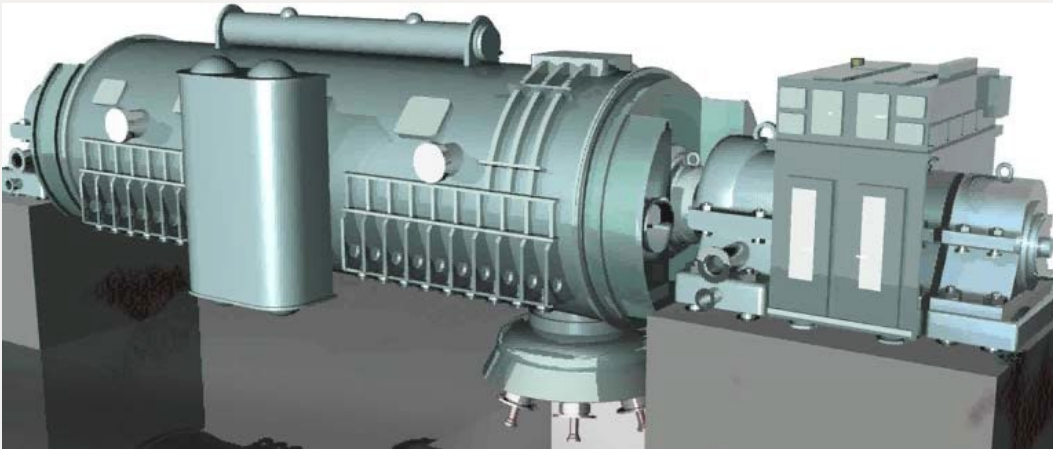
**Rotating electrical
machines**



SC A1 Overview

Study Committee Purpose

SC A1 focuses on the development of new technologies and the international exchange of information and knowledge in the field of rotating electrical machines, to add value to this information and knowledge by means of synthesizing state-of-the-art practices and developing guidelines and recommendations.



SC A1 Overview

Four Advisory Groups / Study Areas

- **Turbo generators:** condition assessment, maintenance, refurbishment, power upgrade, asset management and long term health assessment of such plant.
- **Hydro Generators:** condition assessment, maintenance, refurbishment, power upgrade, asset management and long term health assessment of such plant.
- **Non-conventional Rotating Machines:** focus on wind turbine generators and superconducting machines. In addition review of grid codes as impact on generators.
- **Large Motors and Drives:** focus on Motors >1kV and >500kW. Benefits of High Efficiency Motors, Variable Speed Drives (VSD) on motors and impact of flexible operation of motors.



SC A1 Overview

Key Areas of Interest

- Asset Management to extend the life of existing generators or to recommend their replacement
- Machine monitoring, diagnosis and prognosis to perform optimal maintenance
- Renewable generation which may be connected directly to the transmission and distribution or even directly to consumers setting up microgrids.
- Enhancements in the construction of large turbo and hydro generators
- High efficiency rotating electrical machines with new materials, improving cooling and insulation systems in generators and motors.
- Large motors and high efficiency motors
- Utilization of Polymer nano-composites as near-future HV electrical insulation in rotating machines

2019 SC A1 Activities

Colloquium, Tutorials & WG Meetings in India 22nd to 28th September.

WG Session presentations on progress - 23/09/19

- 4 WG (A1-29, A1-31, A1-37, A1-39) finished
- 3 WG (A1-33, A1-48, A1-50) at final stage
- 3 new WG (A1-63, A1-65, A1/C4-66) proposed with TOR approved

SC A1 Chairman Summary - 24/09/19

- Technical Council meeting and activities,
- Review of Cigre membership status,
- Women with Cigre, e-Cigre, KMS,
- Proposal for 2021 Colloquium in Japan and 2023 in Russia.

Four Tutorials were presented 25/09/19

- Magnetic Core Dimensioning Limits in Hydro-Generators
- Application of dielectric dissipation factor measurements on new stator coils and bars



2019 SC A1 Activities

Colloquium, Tutorials & WG Meetings in India 22nd to 28th September.

- Guidance on the Requirements for High speed Balancing/over speed testing of turbine Generator Rotors following Maintenance or Repair
- Guide for Cleanliness and Proper storage of Generators and Components

SC A1 Colloquium 26/09/19 and 27/09/19 two main Preferential Subjects:

- PS 1 - High Renewable Penetrated Networks
- PS 2 - Operational Experience and New Developments
- 24 presentations on:
 - large turbo-generators and hydro-generators
 - machine insulation system, and, large motors.

Two technical tours

- 22/09/19 - Dadri PS where it has 500MW of coal-fire power plant, a Combined Cycle Gas based Power Plant, and an Integrated Solar Thermal Hybrid Plant, which utilise solar thermal energy to heat feed water and enhance efficiency of the thermal power plant.
- 28/09/19 - Agra 800kV 6000MW HVDC terminal station.

Relevance to Australia

Turbo and hydro generators

- Recently completed Technical Brochure 690 - Vibration and stability problems met in New, Old and Refurbished Hydro-generators, Root Causes and Consequences
- WG A1-29 Guide on New Generator - Grid Interaction Requirements. Highly relevant to prevention of wide spread state blackout similar to that in 2016 in South Australia.
- WG A1-31 State of Art of Stator Winding Supports in slot area and winding overhang of hydro generators & WG A1-37 Generator Stator windings support systems experience. Highly relevant to the old turbo and hydro generators.
- New Working Group proposed - Guide on Synchronous Condensers for System Inertia, Short Circuit withstand capability (fault levels) and MVAr support in power grids with high level of renewable energy generation.

Thank you