

# Paris Session 2022



## Controlled Switching

SC A3 – PS3 – Q14: Controlled switching technology, known for about thirty years, seems to experience a renewed interest and applied more and more frequently. What is the reason for that? Higher reliability, more trust in this technology, possibility to be integrated in IEC 61850 digital substations?

Urmil Parikh - Sweden

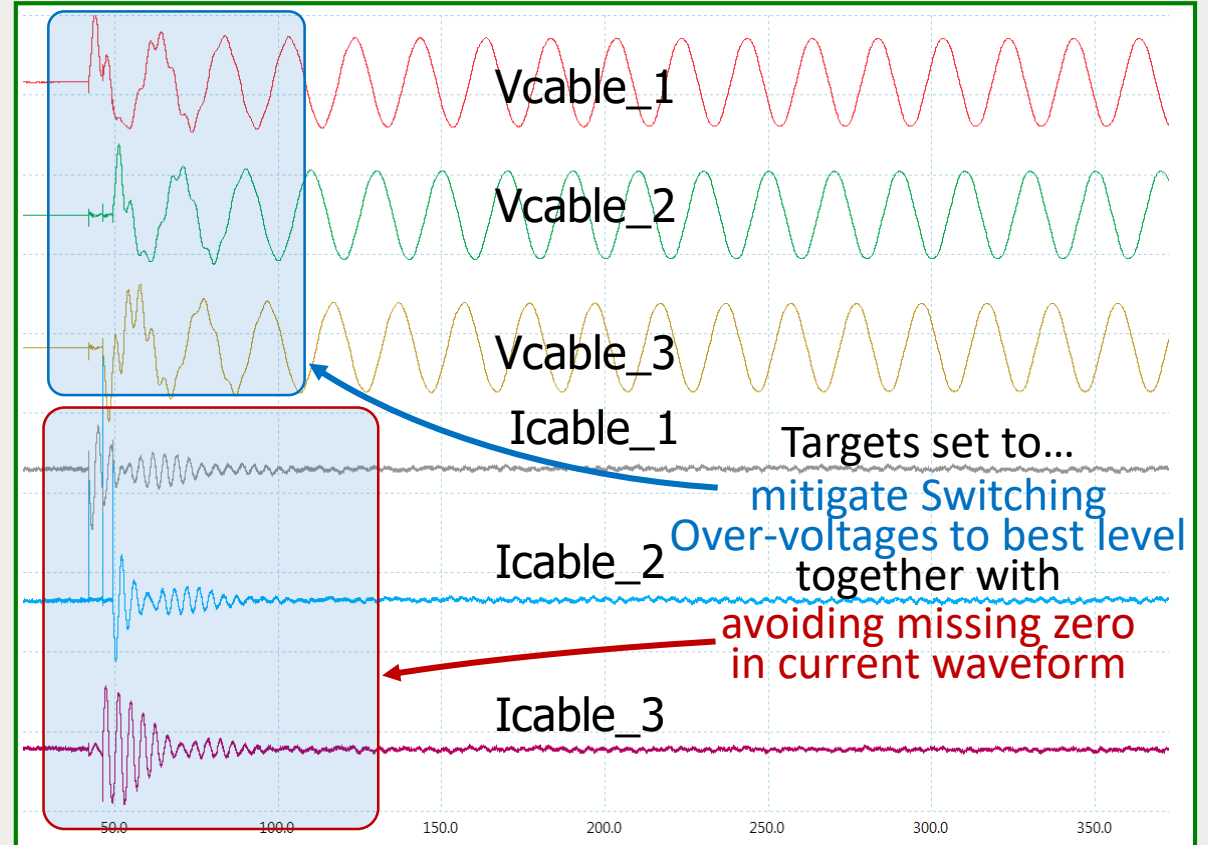
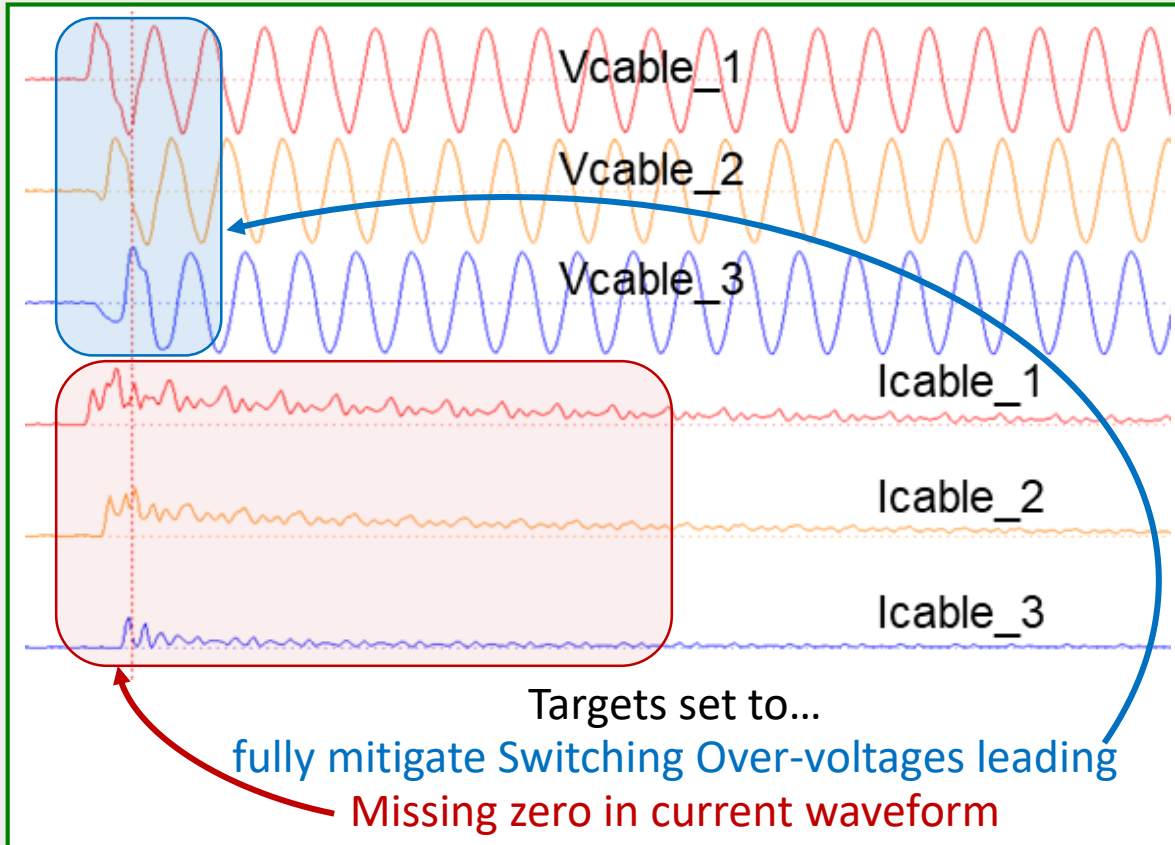
**HITACHI**  
Inspire the Next

# Controlled Switching Success factors

- Handling power system related issues
  - Improvement in grid reliability during switching events
  - Managing reactive power requirements of weak grids
  - Emerging applications for managing renewable grids & industrial plants
- Asset optimization & Life cycle management for power equipment & switchgear
  - Maximized availability and reliability
  - Reduction in failure rates
  - Optimization in maintenance requirements of the circuit breakers connected to
    - Capacitor banks, Reactors & Power plants
- Digitization of relays and Integration into digital substations
  - Optimum switching performance together with digital monitoring & asset management
  - Integration with IEC 61850 and SCADA

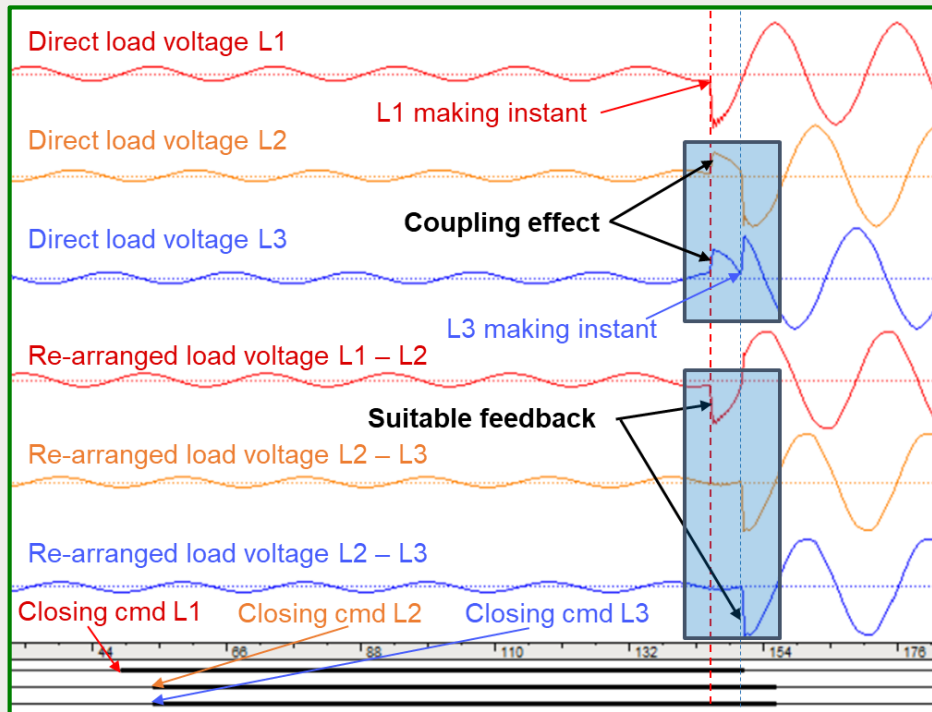
Group Discussion Meeting

# Renewable application: Compensated Cable

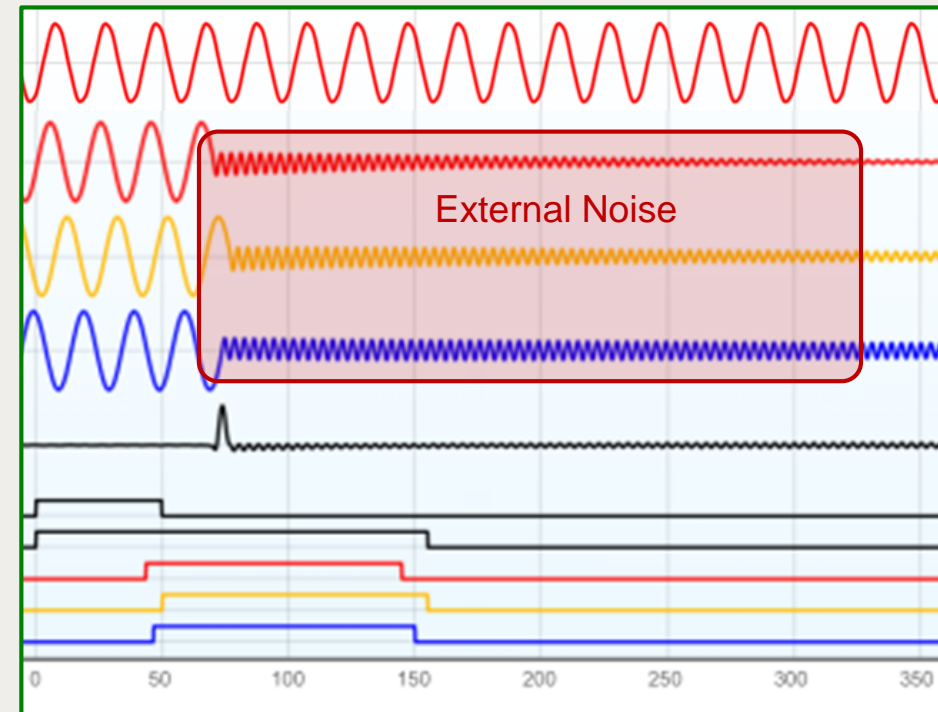


# Digital relays with advanced monitoring algorithms

- Improvement in monitoring and adaptation to deviation in switching targets
  - Handling interphase coupling effects & compensating external noise with digital filtering



*Elimination of interphase coupling effect of load voltage to use as feedback during transformer energization*

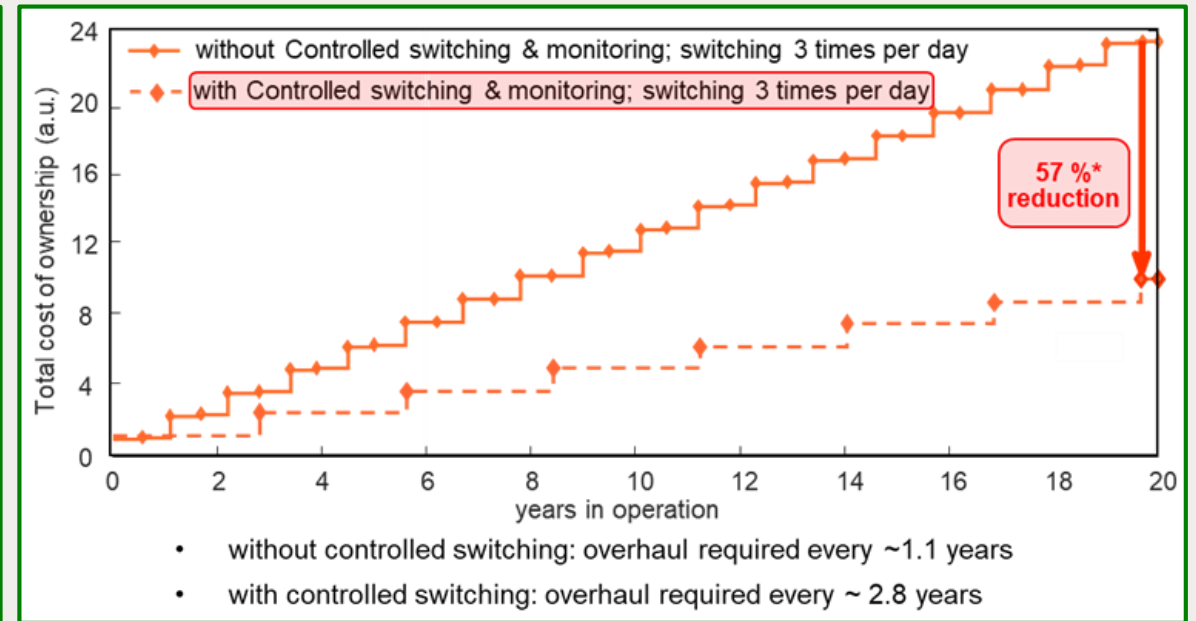
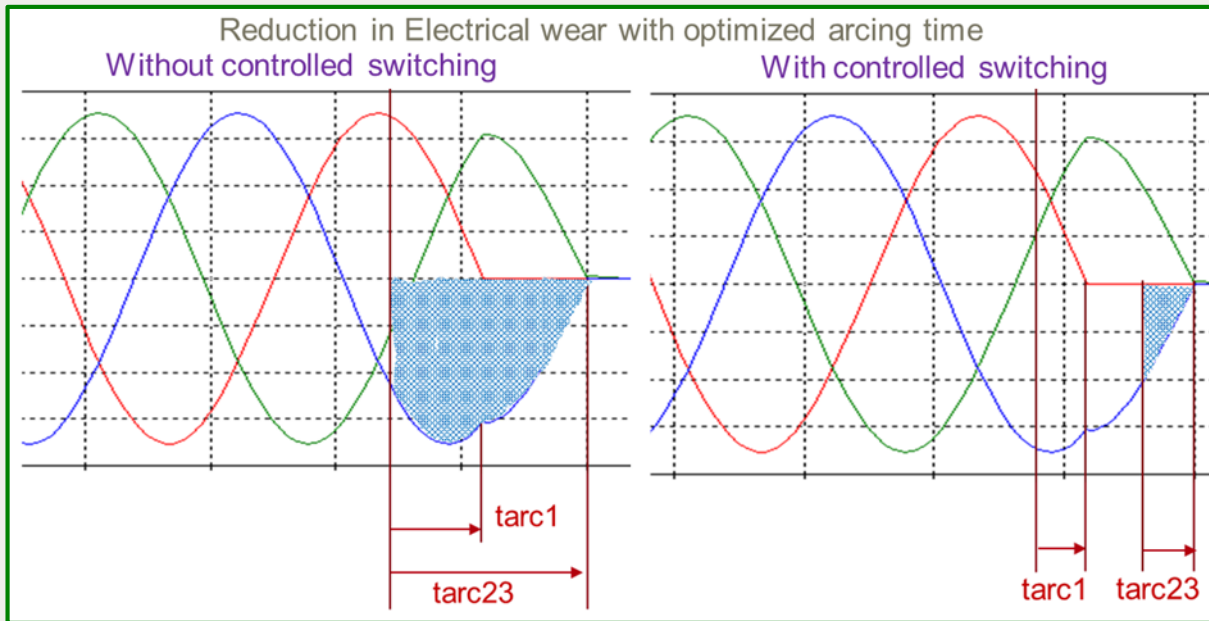


*Elimination of external noise effect of current to use as feedback during reactor de-energization*

Group Discussion Meeting

# Maintenance optimization for Circuit breakers

## Indicative Example: Circuit breaker for a power plant



\* Figures are indicative for demonstration purpose and need to be evaluated on case-to-case bases



# Digital substation: IEC 61850-9-2 (LE)

