Introduction to Asia Power Quality Initiative (APQI) -

APQI - A platform to change attitude towards PQ

Interactive Workshop

On PQ Application Note for Secondary Steel Industry

RAIPUR / NAGPUR

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Copper Alliance

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ASIA POWER QUALITY INITIATIVE

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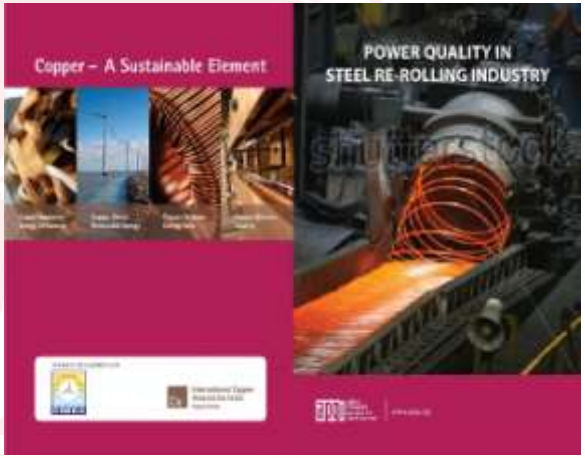
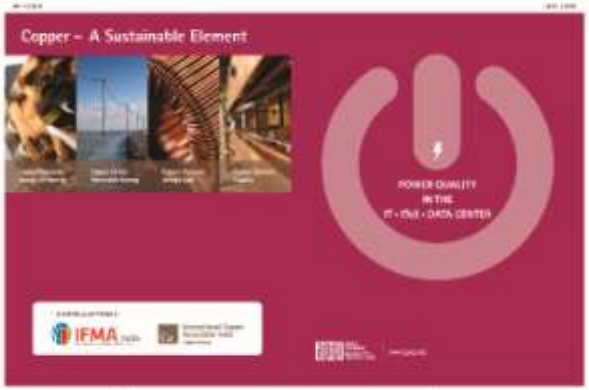
A presentation of

APQI





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Asia Power Quality Initiative

- Program initiated in Asia with the background of the European Experiment (LPQI) – Continuing Professional Development

- A ***neutral collaborative platform*** shared by National Support Network (**NSN**) Partners to promote **education and awareness** and facilitate policy changes.
- **Objective**:
  - help industries in Asia **address Power Quality issues** as a means to enhance their competitiveness in terms of better production output quality, reduced production costs, reduced production line interruption and batch losses.

  - **Building up capacity** of industry / service sector in identifying and addressing PQ issues as a means to enhance their continuous quality delivery

  - Facilitate policy changes and market transformation towards '**Safe and Quality Power for All**'.

Background

Asia Power Quality Initiative (APQI) is an initiative for capacity building, education and awareness on power quality.

- APQI is jointly promoted by ICAI with ICA and the Electrical and Electronics Institute, Thailand, the University of Bergamo (Italy) and the European Copper Institute (ECI, Belgium).

- APQI aims to create an independent platform that would build awareness and capacities on issues related to Power Quality. The initiative has local chapters in as many as seven Asian and Southeast Asian countries. In India, the ICAI leads the initiative.

- APQI has been established with initial financial support from the European Union's Asia-Invest programme. The initiative builds on the success of the Leonardo Power Quality Initiative (LPQI) established in Europe by the European Copper Institute, Belgium.

How PQ Affects Us

Measure of Power Quality

Deviation of waveform of supply voltage or load current from sinusoidal waveform at rated frequency with amplitude corresponding to the rated rms value for all three phases in a three phase system.

Effects of Poor Power Quality

Technical Aspects

1.Sudden short duration deviation
2.Impulsive and oscillatory transients
3.Voltage dips/ sags
4.Short interruptions
5.Harmonics and flicker
6.EMI
7.Losses & heating in electric equipments

Effects of Poor Power Quality

Commercial Aspects

1.Damage to capital intensive equipment
2.Compromise in safety aspects
3.Loss of reliability of operations
4.Economic loss
5.Reputational loss
6.Productivity loss
7.Lower life span of electrical equipment

Causes of Poor Power Quality

1.Usage of sub-standard material in construction of electrical equipment
2.Lack of standards/ low standards for power equipment
3.Single minded focus on costs savings at the expense of quality

Educational Objectives

- To help the professionals :
  - Recognise
  - Diagnose
  - Evaluate power quality, power utilization and EMC problems

in privately-operated, low/medium-voltage electrical installations

APQI now reaches over 70,000 individuals per year

Regulators

Academics

Electricity & Energy professionals

- Design engineers
- Qualified contractors,
- Installers…

End-users (Utility / Industry)

- Maintenance professionals
- Building & facility managers
- Property developers
- Architects

APQI already reaches 7 countries

Learning from APQI : A focus around 3 Missions

A **reference** for all PQ matters in Asia	**Education & training** fine tuned for individuals	Lead the dynamic through adequate **knowledge management & E-dissemination**
A network of European /Asian PQ experts (standardization/certification body participation) Leads appropriate PQ study (PQ Survey, PQ Regulation report)	Print publications Electronic library	Website Forums Seminars Webinars

www.apqi.org

Typical Load in SRRM

- Furnace
- Rolling Mill Drives
- HVAC Loads Such As AHUs, Pumps And Compressors Fitted With Variable Frequency Drives (VFD)
- Light Fittings With Electronic Ballasts
- BMS Systems Such As Fire Alarm, CCTV, Access Control
- IT Equipment Such As Desk-top Pcs, Servers & Switches
- UPS and DC Power Supplies
- AV Equipment such As Projectors, LCD TV, Audio-Video Systems

ALL ABOVE LOADS ARE ELECTRONIC AND HARMONIC RICH IN NATURE.

Common Power Quality Issues Faced by Secondary Steel Sector

- Harmonics – Due to type of load
- Voltage Dips -- Due to heavy individual loads
- Grounding and earthing- Critical nature of UPS and other IT equipment
- Unbalance Voltage – Due to high percentage of single phase loads
- Transients – Due to capacitor switching and natural events
- Voltage variations – From grid or internal loads
- Reactive Power Issues -- Really out of furnace and motive loads in operation

Risks Faced by Industry Due to Poor Power Quality

- Failure of Cables (especially neutral conductor designed conventionally)
- Failure of capacitors / Motors
- Fire due to burning of cables
- Damage of computers/Electronics components
- Computer Lock Reboot (data loss)
- Failure of Standby Power Supply source to pick up at start
- Malfunctioning of ELCB/RCD
- Increased electricity charges/bills

Financial Impact of Poor Power Quality

- Direct financial impact:
  - Increased electricity charges - kVAh billing
  - Damage of electronic component
  - Damage to properties due to fire
  - Reduced life of motors / other electrical installations

- Intangible loss
  - Loss of data
  - Loss of man-hour
  - Loss of opportunity
  - Impact on data communication

Objective of Application Note

- Understand current power quality scenario in Indian Secondary Steel sector in depth and general PQ issues faced
- Create awareness about power quality among sector
- Educate sector about financial impact of power quality
- How to approach PQ issues n Challenges
- Scenario of available PQ mitigation techniques
- Case studies

Deliverable of Application Note

- Recommended power quality parameters for the installation
- Source/s of poor power quality
- Effect on installation due to poor power quality
- Financial implication of poor power quality
- Available mitigation techniques and their analysis
- Case studies where mitigation techniques are adopted
- Check list for pre & post installation

Key Findings in Application Note

- Design & Installation issues
- Grid side PQ issues
- Operation related power quality issues

Design & Installation

- Design of power distribution system in beginning and later on expansion
- Earthing and grounding related issues – misconceptions and wrong practices
- Installation practice for UPS – recommended practices not followed
- Cabling and neutral conductor – Sizing of conductor an issue in smaller facility making them prone for accidents.

Grid side PQ issues

- Voltage variation and
  - Sometimes more than permissible if within limits very frequent
- Transients
  - Due to switching of substation capacitors
- Power failure

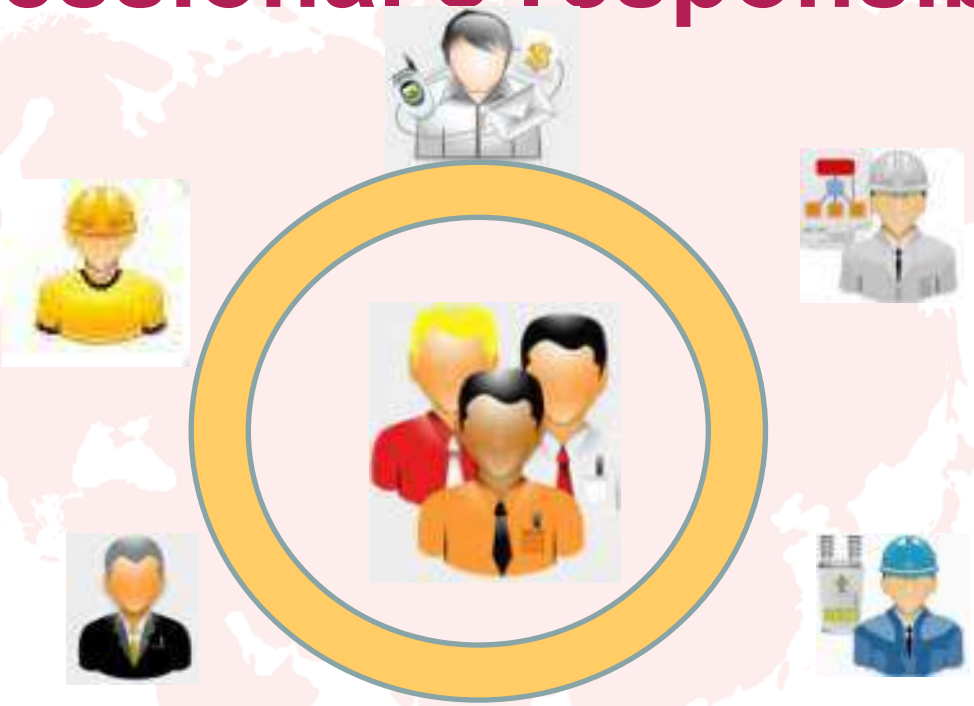
Operation related power quality issues

- Harmonics – Due to nature of load, particularly Triplen (third harmonics predominant)
- Voltage unbalance – Due to difference in design and operating practices
  – Due to single phase loads like lighting
- Transients – Due to local capacitor bank switching

Application Note Outcome

- Handbook in terms of good practice guide
- Highlights various power quality issues present in Secondary steel industries and their impact on the system
- Clears misconceptions about critical issues like UPS installation, earthing and neutral layout
- Recommendations for improving power quality during design stage or in existing facility
- Checklist for easy reference

Ensuring High Power Quality is every professional's responsibility



High Power Quality benefits all

It increases safety, reliability, productivity, profitability & competitiveness,
It improves customer relationship & ensures better employee loyalty

Visit : **www.apqi.org**

Address http://www.apqi.org Go