



COURSE TITLE

INSTRUMENTATION INTEGRITY & RELIABILITY AUDIT



BUILDING COMPETENCE, INSPIRING CONFIDENCE

Course Objectives

- Conduct systematic integrity and reliability inspections of field instruments and control systems
- Identify installation deficiencies, aging issues, and potential failure risks in gauges, transmitters, valves, SOVs, and accessories
- Verify calibration, loop integrity, grounding, sealing, and air quality standards
- Assess condition of cables, junction boxes, machine monitoring systems, and storage practices
- Recommend preventive and corrective actions to improve plant reliability and reduce unplanned trips

Target Audience

- Operations/ Maintenance Engineers



In-Depth Inspection of Instruments and Systems to Verify Functionality and Identify Potential Failure Risks

Pressure Gauges

- Installation condition and suitability
- Visible hunting, sticking, or malfunction
- Assessment of risk of failure

Transmitters (Pressure, Flow, Level)

- Installation verification
- Mismatch in indication or calibration issues
- Cable gland and sealing gasket condition
- Exposure to direct sunlight or other adverse environmental conditions
- Assessment of risk of failure

Junction Boxes (JBs)

- Bolts properly installed, tight, and not short-bolted
- JB seals intact and cable glands in healthy condition
- Grounding cable inspection (as per plant practice)
- Inspection for rusting or carbon deposits on lugs
- Megger testing of approximately 10% of cables (with suitable test voltage) to verify cable insulation integrity, if abnormalities are suspected

Instrument Headers

- Proper tagging in place
- One tube connected to one valve (no downstream division from headers)
- Condensate properly removed
- Locks provided on individual header valves

Instrument Air Quality

- Thorough inspection of instrument air quality
- No moisture
- No dust
- No oil contamination

Transmitters / Switches

- Primary element inspection (where required or mandatory)
- Impulse lines free from choking
- Two-point calibration completed
- Loop integrity verified up to DCS (simulation if required)
- Transmitter sealing and cable gland condition verified
- Cable grounding verified

Solenoid Valves (SOVs) / Electro-Pneumatic Positioners (EPs)

- Vent port blockage check
- Supply pressure regulator inspection (replace if required, considering aging)
- Functional testing (replace SOVs based on aging where applicable)
- Sealing and cable gland condition verified
- Cable grounding verified
- Review of any plant trips caused by SOV malfunction

Control Valves (Post- Maintenance Tests)

- Gland tightness check
- Gland leakage check
- Vent port blockage inspection
- Bench set and supply pressure ratio verification
- Supply pressure regulator inspection (replace if required, considering aging)
- Stroke testing
- Diaphragm replacement verification based on aging
- Opening and closing time verification

Control Valve Accessories

Pressure Regulators

- Moisture in filters
- Correct orientation
- Gauge condition

Trip Relays

- Supply pressure and setting verification
- Vent port condition
- Vibration observed in tubing

Quick Exhaust Valves

- Diaphragm aging assessment
- Leakage inspection
- Installation as close as possible to actuator

Volume Boosters

- Supply pressure verification
- Bypass valve locked in position after setting

Warehouse Inspection

Soft Materials

- Air-conditioning availability
- Dust protection
- Shelf-life and aging control

Cable Drums

- Storage conditions
- Rusting of strands
- Protection of exposed cable ends



Miscellaneous

Cables in Trays

- Thorough inspection of cable trays
- No sharp edges
- No sagging
- No hanging cables
- Cables properly dressed and secured



Machine Monitoring System (Vibration / Speed Instruments)

- Verification of static characteristics of vibration instruments
- Grounding brush condition
- Physical inspection of vibration cables for damage
- Logging of serial and model numbers
- Verification of routing of cables and thermocouples
- Proper use and sealing of cable feed-through assemblies (grommets, etc.)
- Verification that XT and VT initial voltages are set as per standard protocol
- Verification of normal and counter-thrust directions on DCS

Instructor



Mr. Aftab Ahmed Mazari **Instrumentation Expert**

Mr. Aftab Ahmed Mazari has over 43 years of extensive practical experience as an Instrument Engineer. He completed his science graduation from Punjab University and received industrial instrumentation training from Russia.

He began his professional career at Pakistan Steel, where he served for 10 years. He later joined Fauji Fertilizer Company (FFC) and retired after completing 30 years of service with rich and diverse experience. Following his retirement, he worked as an Instrument and Consultant Engineer with SABIC in Saudi Arabia for one year.

Mr. Aftab Ahmed Mazari possesses wide expertise in instrumentation consultancy, Reliability Centered Maintenance (RCM), reliability engineering, and professional training. He has delivered training programs and courses to both local and international clients, including SABIC in Saudi Arabia and multinational companies such as ENI, Lotte, BHP, Engro, and HUBCO.

He has developed several training aids for instrument engineers and technicians, including simulators and training rigs such as vibration simulators, vibration switch testing rigs, speed simulators, compound gear simulators, and SOV training rigs. In addition, he has designed and produced cutaway models of control valves, pressure safety valves (PSV), rotameters, temperature sensors, pressure regulators, volume boosters, and trip relays.

Mr. Aftab Ahmed Mazari has also authored eight industrial instrumentation books for instrument and operations personnel, which are widely referred to in various industrial facilities across Pakistan.

Logistics

Duration

3 days

Location

Client site or Lahore

Training Instructors

Mr. Aftab Ahmed Mazari

Get in Touch

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