Excerpt: Webinar on "Air Cooled Condenser: Design, Construction Features, Commissioning and Performance Optimization" – Practical Wisdom from STEAG India's Webinar

This excerpt summarizes our August 23, 2025, webinar on "Air Cooled Condenser: Design, Construction Features, Commissioning and Performance Optimization." As a CEA-recognized expert, we promote water-efficient tech. Watch the full recording on our YouTube channel or register for future sessions to enhance your plant's sustainability!

Why ACC? Tackling Water Scarcity with Smart Cooling

Think of a 660 MW plant guzzling 3,000 KL/hour of water for cooling—now imagine slashing that by 70-75% with ACC, saving Rs. 10-20 crores yearly amid rising costs (natural water Rs. 5-30/KL, STP Rs. 100/KL). In my 40 years, ACCs have become vital as water prioritizes irrigation/human use, influenced by policies and environment. Traditional water-cooled condensers (WCC) are cheap/efficient but unsustainable in deficit areas; ACC uses air, reducing consumption 50-60% overall.

Our August 23, 2025, STEAG India webinar, attended by engineers across India, covered basics: Heat transfer equations (Q = MSdT = LMTDAU) show saturation temp ties to cooling medium (T_sat = T_cm + ITD). Dry cooling types: Direct (ACC—steam to air) vs. indirect (Heller—water loop). Polls: 70% face water shortages.

Design and Construction: Key Features for Reliability

ACC Overview: Modular A-frame or V-frame setup with finned tubes (aluminum fins on steel cores) for enhanced heat transfer—general arrangement includes steam ducts, fans (axial, VFD-controlled), and support structures. Design features: Finned tubes (elliptical/round, galvanized for corrosion); de-aerating sections vent non-condensables; draining systems prevent freezing; vacuum systems (hogging/holding ejectors or pumps) maintain <100 mbara.

Flow Diagram: Turbine exhaust to manifolds, condenses in bundles, condensate to hotwell via tank—air evacuation via ejectors/pumps. Construction: Off-site fab for tubes/supports; on-site assembly with cranes. Photos show street layouts (rows of cells) for airflow.

Component	Function	Key Spec
Finned Tubes	Heat exchange	Al fins, steel core; 25-30 fins/m
Fans	Air flow	Axial, 8-12 m dia; 50-100 kW
Vacuum System	Air removal	Ejectors (steam) or pumps; 2-stage
Drains	Condensate mgmt	Gravity/siphons; anti-freeze heaters

Commissioning, Ops, and Optimization: Ensuring Peak Performance

Turbine Back Pressure Control: VFD fans adjust speed based on ambient/ITD—target 10-15°C rise; auto sequencing for efficiency. Alarms/Trips: High back pressure (>150 mbara), low condensate level, fan vibration (>5 mm/s), vacuum leak (rise >10 mbar/min).

Start-Up/Shutdown: Pre-start checks (leaks, alignments); hogging to <200 mbar, then holding; shutdown: Isolate steam, drain, anti-freeze mode. Maintenance: Clean fins quarterly (high-

pressure water, avoid chemicals); inspect bundles annually; lube fans/gearboxes; monitor fouling (dust/pollen reduces U by 20%).

Comparison: ACC vs. WCC—higher capex (20-30%) but zero water use; challenges: Higher back pressure (80-150 mbar vs. 50-80), ambient sensitivity (ITD 25-35°C), noise (fans 80-90 dB). Optimization: Hybrid wet-dry modes, coatings for fouling resistance.

Case: A 500 MW ACC plant cut water use 75%, but optimized fans saved 5% aux power.

Exclusive Expert Tips: 35 Years of Cooling Mastery

1. **Design Optimization:** Size for max ambient +5°C margin; use CFD for airflow—avoids hot air recirculation (cuts efficiency 10%).
2. **Construction Best Practices:** Modular pre-fab reduces site time 30%; ensure bundle alignment <1 mm for leak-free.
3. **Commissioning Smoothly:** Leak test at 1.5x vacuum; tune VFDs for 60-80% speed at design load.
4. **Performance Boost:** Monitor LMTD trends; clean seasonally—regain 5-10 mbar vacuum.
5. **Challenge Mitigation:** Add louvers for wind effects; hybrid sprays for peak summer (5-10% output gain).

These have boosted reliability in arid zones.

Why STEAG India? Your Guide to Efficient Cooling

Blending German engineering with Indian expertise, STEAG India's CEA-accredited webinars empower participants on PAN India level, yielding positive results.

Similar webinars with interactive Q&A sessions will be arranged in the future. Please participate—we'll also repeat some topics with the latest updates. We look forward to your overwhelming participation!