

## List of Calculations

**Fan Calculations.**

- ✓ Fan Power calculations
- ✓ Fan efficiency calculations
- ✓ Fan Laws

**Flue Gas and Air Density Calculations (NEW ADDITION TO COURSE).**

- ✓ Flue gas or air absolute density calculation
- ✓ Density calculation at Point 2 knowing density at reference point X.  
(Convert flow to Normal flow, Density to Normal density)

**Separator Calculations.**

- ✓ Separator efficiency in terms of fine recovery.
- ✓ Separator efficiency in terms of energy saving.

**Pyro-Design Calculations.**

- ✓ Kiln L/D Calculation.
- ✓ Effective Diameter Calculation Deff.
- ✓ Total Surface Area Calculation.
- ✓ Kiln Volumetric Loading Calculation.
- ✓ Kiln Thermal Loading Calculation.
- ✓ Degree of Filling Calculation.
- ✓ Kiln Residence Time Calculation.
- ✓ Cooler Loading Calculation.
- ✓ Grate Cooler Residence Time.

**Pyro-False and Excess Air Calculation.**

- ✓ False Air Calculation O<sub>2</sub> Basis (Pyro + Mills).
- ✓ False Air Calculation CO<sub>2</sub> Basis (Pyro + Mills).
- ✓ Excess Air Calculation.

**Pyro-Heat Loss Calculations.**

- ✓ Free Convection Heat Loss Calculation.
- ✓ Forced Convection Heat Loss Calculation.
- ✓ Radiation heat loss Calculations

**Combustion Calculation-Calorific Value.**

- ✓ Calorific Value Calculation for Coal (Solid Fuels).
- ✓ Calorific Value Calculation for Oil (Liquid Fuels).
- ✓ Calorific Value Calculation for Natural Gas (Gaseous Fuels).

**Combustion Calculation- Air Requirement for combustion.**

- ✓ Specific Stoichiometric/minimum Combustion Air
- ✓ Stoichiometric/minimum Combustion Air Flow Rate.

**Combustion Calculations-Kiln Firing.**

- ✓ Theoretical Flame Temperature Calculation.
- ✓ Primary Air % Calculation.
- ✓ Burner Tip Velocity Calculation.
- ✓ Flame Momentum Calculation.

**Grinding Calculation-Ball Mill Design.**

- ✓ Critical Speed ( $n_c$ ) & Mill Speed ( $n$ )
- ✓ Degree of Filling (%DF)
- ✓ Maximum ball size (MBS)

**Grinding Calculation-Ball Mill Power.**

- ✓ Arm of gravity ( $a$ )
- ✓ Net Power Consumption ( $P_n$ )
- ✓ Gross Power Consumption ( $P_g$ )

**Grinding Calculation-Production Prediction at different Fineness**

- ✓ New Production rate (Blain Based)
- ✓ New Production rate (Residue Based)

**KPI Calculations (NEW ADDITION TO COURSE).**

- ✓ Specific Power Consumption per kg of Clinker.
- ✓ Specific Heat Consumption per kg of clinker.
- ✓ Specific Air Consumption for Clinker Cooling.

**Cement Mill (Ball Mill) Water Spray Calculation (NEW ADDITION TO COURSE).**

- ✓ Quantum of Heat to be Removed with water spray.
  - ✓ Water spray rate required to cool from temp.  $T_2$  to  $T_1$ (115 °C)
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