IMPACT OF BAD DESIGN ON TG BOILER OPERATION PERFORMANCE

Most of the time, Credit of all failures & limitations goes to faulty operation of Boiler, because We are neglecting the other important aspect. Due to non availability of technical details and concentrating only on easily identified facts to conclude the fault.

PLEASE REMEMBER THAT: After the Defect Liability Period is over, all the existing defects are Plant's Personnel Liability & Responsibility

Few Examples, may help to clarify my views:-

1. All ESP failure/explosion, highlighted as CO ACCUMULATION & faulty Operation

NO-ONE HIGHLIGHT THAT - It is a case of

a. **BAD ESP HOPPER DESIGN,** Ash accumulation in Ash Hopper
b. **BAD ESP NOZZLE DESIGN,** Ash accumulation in ESP Inlet & Outlet Nozzle
c. **LOW OPENING & MOUTH CHOCKING OF ASH HOPPER -** Ash not evaluated from ash hopper while ash handling system is running good
d. **BAD LOCATION OF INSTRUMENTS IN ESP HOPPER,** Ash accumulation not sensed in Ash Hopper
e. **BAD SECONDARY AIR CURTAIN DESIGN (OFA),** Unburnt carry over happened in downstream of flue gas path
f. **LOW CAPACITY OF SA FAN,** Air pressure curtain on all elevation was not formed and unburnt carry to downstream continue

2. HIGH ECONOMISER OUTLET FEED WATER TEMPERATURE, highlighted as Operational

NO-ONE HIGHLIGHT THAT - It is a case of

a. **BAD DESIGN OF ECONOMISER,** As a Good Engineering practice, The difference between Steam Drum Saturation Temperature & Economiser Outlet Feed Water Temperature, to be around 20 degC. **Lot of SLOP FIRED BOILERS are operating at Less difference i.e. 6 to 10 degC**, lead to pre-mature failures of pressure parts. High Difference is also loss of energy potential in flue gas & high back end temperature
b. **BAD CIRCULATION RATIO,** A Low difference of temperature will disturb circulation ratio, lead to pre-mature failures of pressure parts
c. **BAD DESIGN OF EVAPORATOR,** A Low difference of temperature will disturb circulation ratio, lead to pre-mature failures of pressure parts

3. RISER PIPE failure, highlighted as Boiler Water Chemistry

NO-ONE HIGHLIGHT THAT - It is a case of

a. **BAD VELOCITY PROFILE,** Occurrence of Flow Accelerated Corrosion (FAC) lead to thickness reduction
b. **BAD CIRCULATION RATIO,** Occurrence of Flow Accelerated Corrosion (FAC) lead to thickness reduction

4. CASING BULGING (GAS OUTELT DUCT-GOD, ECONOMISER & APH), highlighted as pressure fluctuation

NO-ONE HIGHLIGHT THAT - It is a case of

a. **BAD EXPANSION PROVISION / NO PROVISION,** Most of the places, Expansion provision not provided OR not taken care properly
b. **BAD GAS FLOW DISTRIBUTION & VELOCITY,** Improper distribution of Gas flow, ash accumulation lead to Casing Vibration & Pulsation
c. **BAD CASING STRENGTHENING,** A jack bolts/guide beam arrangement used to forcefully stop Casing Movement & Pulsation to hide this fault

5. SUPERHEATER COIL FAILURE, highlighted as Operational / Boiler water chemistry

NO-ONE HIGHLIGHT THAT - It is a case of

a. **HIGH ATTEMPERATION - SPRAY WATER QUANTITY,** As a Good Engineering practice it should be minimum as <2 to 3% only. Normally a liberal design restrict to <10%. High Spray Water quantity to control Steam temperature lead to failure & comes under a worst case of design
b. **UNBALANCED FLOW DISTRIBUTION IN SHUPER HEATER,** specific tubes / area lead to failure repeatedly
c. **SECONDARY BURNING AT SHUPER HEATER ZONE,** OFA air curtain bad design and low SA fan pressure lead to it.
d. **ASH ACCUMULATION IN SHUPER HEATER ZONE,** ash collection on goose neck in superheater zone create gas velocity disturbance lead to localise erosion & overheating
e. **BAD SOOT BLOWER CONDENSATE DRAIN PIPING LAYOUT,** non-removal of condensate water from soot blower system increasing failures

6. APH- AIR PREHEATER TUBE FAILURE, highlighted as corrosion

NO-ONE HIGHLIGHT THAT - It is a case of

a. **ASH ACCUMULATION ON APH TUBE SHEET,** ash heap collection on tube sheet, block area of tube holes, gas velocity disturbance lead to localise erosion
b. **BAD GAS & AIR FLOW / VELOCITY DISTRIBUTION IN APH,** increase localise erosion
c. **BAD DESIGN w.r.t. TUBE LENGTH / TUBE SIZE IN APH**

7. REFRACTORY FAILURE, highlighted as operation / start -stop

NO-ONE HIGHLIGHT THAT - It is a case of

a. **BAD APPLICATION & ANCHORING, MATERIAL,** Refractory application with improper mixing, shuttering and anchoring.
b. **BAD CURING & HEATING PROCESS,** improper Refractory curing & temperature control after installation is culprit

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