BOILER STEAM CAPACITY ENHANCEMENT CHECKLIST

When steam demand increases, Most of the companies thick about capacity enhancement of existing Boilers OR Fuel conversion. OEM & Experts suggested a lot of proposals with high cost involvement for Boiler modification for only 10 to 15 % increment in boiler steam capacity against the rated boiler capacity.

Normally boiler is designed with 10 to 15% minimum margin on pressure parts and auxiliaries including BFP, Few OEM already providing guarantees for 110% MCR operation for 30 minutes in once in 8 hour shift. It means Boiler should be capable to operate in extreme overload capacity upto 110% MCR condition also with additional minimum 5 to 10% safe design margin.

We suggest reviewing of the received proposal with existing Boiler technical details & auxiliaries before start the process of steam capacity enhancement.

Generally beyond 10 to 15 % increment limit, steam capacity enhancement is not feasible / possible due to major parts and equipment replacement, OEM & Expert shall not suggest you to do this.

Look at Comparison of Technical Input details required for capacity enhancement and overload operation and indicating safe operation within allowable parameters.

BOILER CAPACITY ENHANCEMENT & OVER LOAD BOILER OPERATION					
TECHNICAL INPUT COMPARISION					
120 TPH, TRAVELLING GRATE BOILER	**% MCR**	**100**	**104**	**108**	**110**
BOILER STEAM CAPACITY	TPH	**120**	**125**	**130**	**132**
Bagasse Consumption on 100% MCR	kg/hr	51280	53191	56034	56897
Bagasse GCV	Kcal/kg	2160	2160	2160	2160
Grate area (Furnace Width x Depth)	m2	48.3	48.3	48.3	48.3
Grate area loading	Mkcal/m2hr	2.29	2.38	2.51	2.54
BOILER EFFICIENCY	%	**70.0**	**69.9**	**69.4**	**69.3**
Steam space loading in Steam Drum	m3/m3/hr	323	336	350	355
Water holding time in steam drum from NWL to LLWL	sec	55	53	51	50
FLUE GAS TEMPERATURE PROFILE					
Furnace exit temperature	degC	835	842	855	868
Flue gas temp boiler bank outlet	degC	465	475	480	480
Flue gas temp economizer outlet	degC	250	252	256	257
Flue gas temp air heater outlet	degC	**150**	**153**	**157**	**159**

Few other changes in boiler you may received like pipe line size increment, increment in heating surface area, fuel feeders replacement, air & gas duct size increment, modification in steam drum internals, refractory application on water walls.

BOILER CAPACITY ENHANCEMENT & OVER LOAD BOILER OPERATION					
TECHNICAL INPUT COMPARISION					
120 TPH, TRAVELLING GRATE BOILER	**% MCR**	**100**	**104**	**108**	**110**
STEAM WATER TEMEPRATURE PROFILE					
Steam temperature at Primary Superheater outlet	degC	425	428	429	429
Steam temperature at Secondary Superheater Inlet after Attemperator	degC	400	400	400	400
Final Steam temperature at Secondary Superheater outlet	degC	510	510	510	510
Attemperator steam temp drop at SSH inlet	degC	25	28	29	29
Feed water temp at deaerator outlet	degC	130	130	130	130
Fed water temp at economiser outlet	degC	286	288	291	293
Steam Drum operating pressure	Kg/cm2g	92.0	92.5	93.0	93.2
Air temp air pre-heater outlet	degC	185	180	176	175
All Safety Valves total steam relieving capacity available	kg/hr	**132000** (Min. Reqd.@110%)			

BOILER CAPACITY ENHANCEMENT & OVER LOAD BOILER OPERATION					
TECHNICAL INPUT COMPARISION					
120 TPH, TRAVELLING GRATE BOILER	**% MCR**	**100**	**104**	**108**	**110**
Boiler Operating Steam capacity	TPH	**120**	**125**	**130**	**132**
ID FAN CAPACITY					
Design flow	m3/sec	52.5	52.5	52.5	52.5
MCR flow	m3/sec	45.7	47.6	49.5	50.2
Flow Margin	%	**15.0**	**10.4**	**6.2**	**4.6**
Design head	mmwc	270	270	270	270
MCR head	mmwc	216	234	254	261
Head Margin	%	**25.0**	**15.2**	**6.5**	**3.3**
FD FAN CAPACITY					
Design flow	m3/sec	28.5	28.5	28.5	28.5
MCR flow	m3/sec	24.8	25.8	26.85	27.26
Flow Margin	%	**15.0**	**10.4**	**6.2**	**4.5**
Design head	mmwc	215	215	215	215
MCR head	mmwc	179	194	210	212
Head Margin	%	**20.0**	**10.6**	**2.2**	**1.5**

BOILER CAPACITY ENHANCEMENT & OVER LOAD BOILER OPERATION					
TECHNICAL INPUT COMPARISION					
120 TPH, TRAVELLING GRATE BOILER	**% MCR**	**100**	**104**	**108**	**110**
Boiler Operating Steam capacity	TPH	**120**	**125**	**130**	**132**
SA FAN CAPACITY					
Design flow	m3/sec	15.5	15.5	15.5	15.5
MCR flow	m3/sec	13.8	14.4	15.0	15.2
Flow Margin	%	**12.00**	**7.52**	**3.38**	**1.82**
Design head	mmwc	660	660	660	660
MCR head	mmwc	550	597	645	651
Head Margin	%	**20.00**	**10.59**	**2.25**	**1.46**
ESP CAPACITY					
Design flue gas quantity	m3/sec	104	104	104	104
MCR flue gas quantity	m3/sec	90.4	94.2	97.9	99.4
Flow Margin	%	**15.0**	**10.4**	**6.2**	**4.6**
Design inlet dust concentration	g/nm3	6	6	6	6
BOILER FEED WATER PUMP CAPACITY					
Feed water temp at deaerator outlet / BFP Inlet	degC	130	130	130	130
Design pump capacity	m3/hr	78.5	78.5	78.5	78.5
MCR flow	m3/hr	65.4	68.1	70.9	71.9
Flow margin	%	**20.0**	**15.23**	**10.80**	**9.12**
Design head	mwc	1230	1230	1230	1230
MCR head	mwc	1118	1165	1211	1230
Feed water pump head margin	%	**10.0**	**5.6**	**1.6**	**0.0**
ASH HANDLING SYSTEM CAPACITY					
Ash % in BAGASSE	%	1.75	1.75	1.75	1.75
Design Ash Handling system Capacity	Kg/Hr	1315	1315	1315	1315
Total Ash Generated by BAGASSE Firing	Kg/Hr	897	931	981	996
Margin	%	**46.53**	**41.27**	**34.10**	**32.07**

M/s Unite Energy Corporation LLP, Ghaziabad, U.P., India is keen to provide the Boiler Spares, Sales & Services, Retrofit & Site Repairs of Boiler & Auxiliaries, Performance Evaluation, Shop & Site Fabrication, Erection & Commissioning, Design Modification & Feasibility Study, Consultancy & troubleshooting support to mitigate the irregularities in the plant, minimize breakdown & downtime and improvise design & system performance to improve the overall plant's health and performance.

Regards
Pramesh Kumar Jain
Chief Executive- Technical
Mobile: **+91 9868499319**
Email: **pramesh.uniteenergy@gmail.com**