1. Raw Material Handling:

The concentrate storage capacity is 40,000 MT and day bins are having 3 x 400 MT capacity.

2. Roaster Furnace:

The Roaster is having 77 Sqr.Mtr hearth area of M./s Lurgi make and design. The Roaster shell including brick lining and Top Dom was replaced in 6 week shutdown in the year 2002. The bottom cone was replaced in the year 1992 and 4000 nos. hearth nozzles were replaced in time to time since 1975. However, the complete set of hearth grid including nozzles duly welded with the frame lying at their site which they were planning to replace in next few months period.

3. Roaster Air Blower :

There are 2 nos. roaster air blowers installed of M/s Schille Make, flow 50,000 NM3/hr., Pressure – 2500 mm wc, having motor of 500 KW, 2900 rpm. First no. impeller was changed in the year 1996, second no. impeller of blower was changed in the year 1999.

4. Waste Heat Boiler:

Waste Heat Boiler is conventional MS brick lined shell having 2 Super Heater Coils and 4 Evaporator coils. The pressure of the Boiler 60 Kg/CM^2 super heated steam and capacity is 28 to 29 MT per hour. Super heater coils and 1^{st} Evaporator coils are having pneumatic hammer type rapping system. The other 3 Evaporator bundles are having mechanical poking system.

Evaporator and Super Heater Coils last replacement schedule was as follows:

Description	Year
Evaporator Coil –I	2001
Super Heater – I	2003
Super Heater –II	1995
Evaporator Coil-II	1985
Evaporator Coil-III	1985
Evaporator Coil-III	1985

The boiler pumps are of M/s KSB Germany and Turbine are of M/s KKK, Germany. Both the circulating pumps 2 nos. and feed pumps 2 nos. are having conventional gland pack system in place of mechanical seals. The maintenance of these pumps are done once in two years by M/s KKK, Germany and M/s KSB experts. Originally, these pumps were of M/s Sulzer but subsequently changed to KSB pump in the year 1980.

5. Boiler Chain Conveyors:

The Hopper of Boiler Chain conveyor was found damaged at 2-3 places. It needs repair.
Casing - O.K.

Guides - OK
Material conveying chain - Not O.K., needs replacement

6. Cyclones :

These are twin cyclone and the top was replaced in the year 1998. Bottom part of cyclone was replaced in the year 1999.

7. Calcine Drum Coolers:

The condition of drum cooler is good as it was replaced in the year 2000-01, supplier BUTTNER, Germany.

8. Calcine Chain Redler Conveyors:

These chain conveyors are of M/s Koch, Germany make.

9. Ball Mills:

There are 2 nos. ball mills.

10. Hot ESP:

There are 2 nos. twin, 2 fields, ESP's of M/s Lurgi make. The internals of ESP's were inspected and found to be satisfactory. The internals were last replaced in the year 1998 and casing is originally installed in 1975.

11. ID Fan :

Make: Schille, the impeller of ID fan was replaced in the year 2003. Hydraulic coupling is of M/s Woith make and is serviced every two years.

12. Wet Scrubber :

Wet scrubber is of conventional design having Lead caged MS construction having refractory and Carbon brick lining inside. Refractory and part lead was changed in the year 1993. Scrubber pumps are of M/s Warnert, Germany make.

13. Gas Coolers :

There are 2 sets of star gas coolers. The first set is of lead MOC which was last replaced in the year 1997, and the other set is made of Graphite Tubes which was replaced in 1991.

14. WET ESP :

There are 2 sets of wet ESPs' having 3 nos. ESPs' in each circuit, having nomenclature as CDE and FGH. These ESP's are of lead construction completely. The replacement schedule of Wet ESPs is as follows:

S.No.	Description	Year
01.	C	1983
02.	D&E	1994
03.	G&H	1997
04	F	1998

15. SO_2 Blowers :

The SO2 blowers of M/s KKK make, Germany and all parts except casing like impeller, Gear Box, White metal bearing, coupling, filter , etc. were replaced in the year 2004, during major overhauling. Motor -1240 KW, 1480 RPM, Blower – 3900 RPM.

16. Acid Towers :

All the 3 Acid towers viz DT, IAT and FAT are MS acid proof brick lined having Demister in DT and FAT and there is no Demister in IAT. These towers are ventury type towers and having no acid circulation vessels. All the towers are having Horizontal type Centrifugal single stage 'RHEIN HUTTE' Pumps and complete acid piping is in SX 'Sandvik' Sulphuric acid duty material.

17. Acid Coolers :

The acid coolers are shell and tube type coolers having SS316 L MOC with anodic protection instead of latest used plate Heat Exchangers. However, party confirmed that after proper anodic protection cooler life is around 10 years.

The last replacement of Acid coolers is as follows:

S.No.	Description	Year
01.	DT	1994
02.	FAT	1998
03.	IAT	2000

The acid piping was changed to SX material between 1991-2000.

18. Gas to Gas Heat Exchangers :

There are 6 nos. shell and tube type Heat Exchangers installed. The Heat Exchangers were replaced as and when required as per the following details:

S.No.	Description	Year
01.	HE-I	2000
02.	HE-II A	1987
03.	HE-II B	1997
04	HE-III	1996
05	HE-IV A	1997
06	HE-IV B	1998

19. Converter :

The Converter is four bed, having SS304 grate and C.I. supports. The shell is MS brick lined. Maintenance generally restricted to repair of nozzles and replacement as and when required. Converter is also not witnessed from inside because of welded construction and Hot insulation outside.

20. Pre-Heater :

3 pass convection type pre heater having 2 nos. burners at the bottom. One burner was replaced in 1996 and the second one was replaced in the year 2002. The burners are manually fired.

21. Mercury Removal System :

Mercury Removal System was installed in 1986 under License from M/s Boleden.

22. Stack :

M.S. Stack is 38.5 Mtr. high and not replaced since 1975.

23. Acid Storage Tanks with loading facility.

Total capacity – 12000 Tons.

3 nos. acid storage tanks, having capacity of 3000 MT – 2 nos. and 6000 MT 1 no.

NEUTRALISATION

Sl.No.	Designation	Volume	Flow rate	Fluid
1	Lime tank	35 T 100 m^3	1 t/h	$Ca(OH)_2$
2	Lime milk tank	6 m^3	20 m^3/h	H_2O-$Ca(OH)_2$
3	Reaction tank	10 m^3		H_2O=H_2SO_4 + $CA(OH)_2$
4	Neutralisation tank	10 m^3	30 m^3/h	H_2O + H_2SO_4 + $CA(OH)_2$
5	Waste material tank	2.5 m^3	30 m^3/h	H_2O
6	Tank	1100 L		H_2O + Na_2S

PRODUCTION H_2SO_4 – ABSORPTION DILUTION

Sl. No.	Designation	Fluid	Flow rate	Theoretical temperatures	Temperature at 550 T/J Mono
1	Dryer	SO_2 8% H_2SO_4 96%	64.400 Nm^3/h 390 m^3/h	TE 40^0 TS 55^0 TE 70^0	TE 40^0 TS 58^0 TE 75^0
2	Intermediate absorber	SO_2=SO_3 H_2SO_4 98.5%	62.100 Nm^3/h 600 m^3/h	TS 55^0 TE 200^0 TS 75^0 TE 95^0	TS 58^0 TE 225^0 TS 95^0 TE 98^0
3	Final absorber	SO_2 + SO_3 H_2SO_4 98.5%	57.200 Nm^3/h 372 m^3/h	TS 75^0 TE 200^0 TS 70^0 TE 95^0	TS 78^0 TE 220^0 TS 90^0 TE 90^0
6	Dilution device	H_2SO_4 98.5% 94%	12 m^3/h	TS 80^0 TE 40^0 TS 40^0	TS 75^0 TE 40^0 TS 45^0

H_2SO_4 PRODUCTION – CATALISED PART

Nr. on plan	Designation	Fluid	Flow rate	Tempertures	Exchange surface	Capacity
S1	Ventilator	SO_2	64.300 Nm^3/h	TE 55^0 TS 85^0		
E4	Heat exchanger IV	SO_2/SO_3	Cold = 64.400 Nm^3/h Warm = 57.435 Nm^3/h	Cold: TE 85^0 Cold: TS 360^0 Warm:TE 425^0 Warm:TS 215^0	2*813 m^2	3.884.000 Kcal/h
E1	Heat exchanger I	SO_2/SO_3	Cold = 64.400 Nm^3/h Warm = 58.320 Nm^3/h	Cold: TE 365^0 Cold: TS 435^0 Warm:TE 560^0 Warm:TS 165^0	893 m^2	2.081.000 Kcal/h
C1 E1	Caisse a catalyse Heat exchanger III	SO_2/SO_3 V_2O_5 SO_2/SO_3	64.400 Nm^3/h Cold = 19.300 Nm^3/h Warm = 57.470 Nm^3/h	 Cold: TE 140^0 Cold: TS 400^0 Warm:TE 475^0 Warm:TS 425^0	Diam2.5m 275 m^2	 1.423.000 Kcal/h
E2	Heat exchanger II	SO_2/SO_3	Cold = 58.925 Nm^3/h Warm = 63.470 Nm^3/h	Cold: TE 95^0 Cold: TS 450^0 Warm:TE 525^0 Warm:TS 225^0	2*1.513 m^3	7.422.000 Kcal/h
V2	Intermediate absorption	SO_2/SO_3 H_2SO_4	62.100 Nm^3/h	TE 225^0 TS 95^0		
V3	Final absorption	SO_2/SO_3 H_2SO_4	57.200 Nm^3/h	TE 220^0 TS 90^0		

WET GAS PURIFICATION

Nr. on plan	Designation	Volume	Flow rate	Temperature
1	Washing Tower	$SO_2 + SO_3 +$ Water	47.000 Nm^3/h and 2*120 m^3/h	Gas: TE 320^0 TS 63^0
2	Decantation	Water + residue	20 m^3/h	63^0 C
3	Circulation tank		16 m^3	63^0 C
4	Carbon coolers	SO_2 + Water	2*23.500 Nm^3/h	Gas: TE 630^0 TS 40^0
5	Wet electro filters	SO_2	3*15.800 Nm^3/h	40^0
6	Fluorine Tower	SO_2 + Water	47.500 Nm^3/h	40^0
7	Wet electro filters	SO_2	3*15.800 Nm^3/h	40^0

PRODUCTION OF BOILER WATER

S.No.	Designation	Flow rate	Pressure	Fluid
1	Cation	8 m^3/h	4 bar	$H_2O – H_2SO_4$
2	Anion	8 m^3/h	3 bar	H_2O – NaOH
3	Carboxylic Buffer	8 m^3/h	2 bar	$H_2O – H_2SO_4$
4	Air condenser	25 t/h	6 bar	Steam - H_2O
5	Storage tank			H_2O

OVEN AND DRY PURIFICATION OF GASSES

Nr. on plan	**Designation**	**Fluid**	**Theoretical Flow rate**	**Flow rate at 550 T/J H_2SO_4**
1	Charging funnel	Blende	100 m^3	
2	Sulphur funnel	Sulphur	10 m^3	
3	Rotating plate	Blende	10 à 30 t/h	
4	Charging machine	Blende (dried)	10 à 30 t/h	
5	Roaster	Blende	600 t/h	
6	Roasting ventilator	Air	50 000 Nm^3/h	42 000 Nm^3/h
7	Boiler	Gas – 10% SO_2	44 500 Nm^3/h	44 500 Nm^3/h
8	Cooler	Calcine	20 t/h	20 t/h
9	Breaker	Calcine	20 t/h	20 t/h
10	Cyclones	Gas – 10% SO_2	44 500 Nm^3/h	44 500 Nm^3/h
11	Dry electro filters	Gas – 10% SO_2	45 000 Nm^3/h	45 000 Nm^3/h
12	Breaker	Calcine	23 t/h	23 t/h
13	Intermediate ventilator	10 % SO_2	70 000 Nm^3/h	47 000 Nm^3/h

MINERAL STOCK

S.No.	Designation	Volume	Flow rate	Dimensions
1	Unloading device		2 x 300 t/h	
2	Storage hall	40 000 t		120 m x 48 m
3	Funnels	400 t x 3		Height 13.4 m Side 5 m
4	Strainer		100 t/h	
5	Chain breaker			
6	Transporter		600 t/h	L 170 m
7	Transporter		150 t/h	L 81 m
8	Transporter		100 t/h	L 79 m