بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Technical Paper & Case Study
Presentation for PSST Annual Workshop
Being Held at Lahore on 20th June, 2022

1. **Technical Paper**

   - Benefits of Overhead A-Mass Cooling Crystallizer

2. **Case Study**

   - Determination of Bagasse Loss due to Incomplete Combustion at Boilers

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Benefit of Overhead A-Mass Cooling Crystallizer

Before A- Mass Cooling					
Date	A-Mess PTY	A-Melt PTY	A-Heavy PTY	Crystal Contents (%)	Final Molasses PTY
24-Nov	82.65	95.8	69.07	51.00	35.17
After A-Mass Cooling					
24-Nov	82.65	95.80	64.35	58.25	35.17
25-Nov	82.31	96.27	64.66	56.00	34.56
26-Nov	82.50	96.33	65.30	55.54	34.31
Avg	–	–	64.77	56.60	*34.43

Results:

After A.Mass Cooling through Overhead A.Mass Cooling Crystallizer:

I - Average A-Sugar crystal contents increased from 51.0 to 56.60 i.e 10.98%
ii- Average Final Molasses Pty decreased from 35.17 to 34.43 i.e 0.74 degree
iii- Average Final Molasses Pty decreased from 33.14 to 32.24 for season 2021-22 as compared with season 2020-21 i.c. 0.89 degree.
iv - B & C Mass pty control become easy as A.H Pty decreased from 69 to 64.
Average increase recovery for season 2021-22 due to final Molasses Pty control than season 2020-21 was 0.02%
(Ref RT4 Final for Season 2021-22)

Remarks:

Overhead A-Mass cooling crystallizer :
i- Low cost equipments as compared with vertical crystallizer.
ii- Easy eraction.
iii- Minimum space utilization .
iv- Easy operation & control .
v- Fast liquidation on demand.

* This is 2 days average of 25 & 26th Nov.

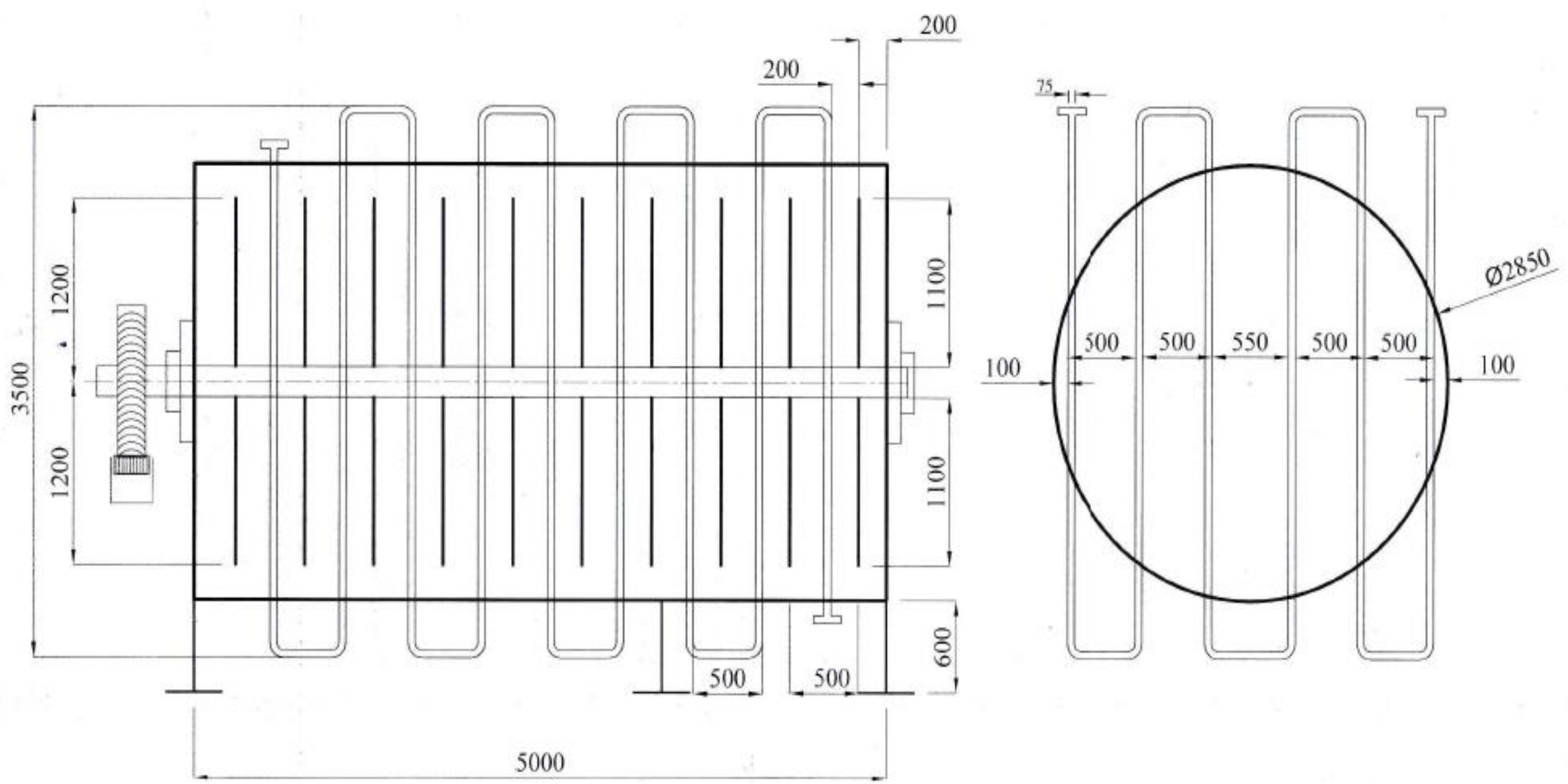
Attachments:

Exhibit - 1 Sketch of A-Massecuite Cooling Crystallizer

Exhibit - 2 Overhead A-Massecuite Cooling Crystallizer

Exhibit - 1

Sketch of A-Massecuite Cooling Crystallizer

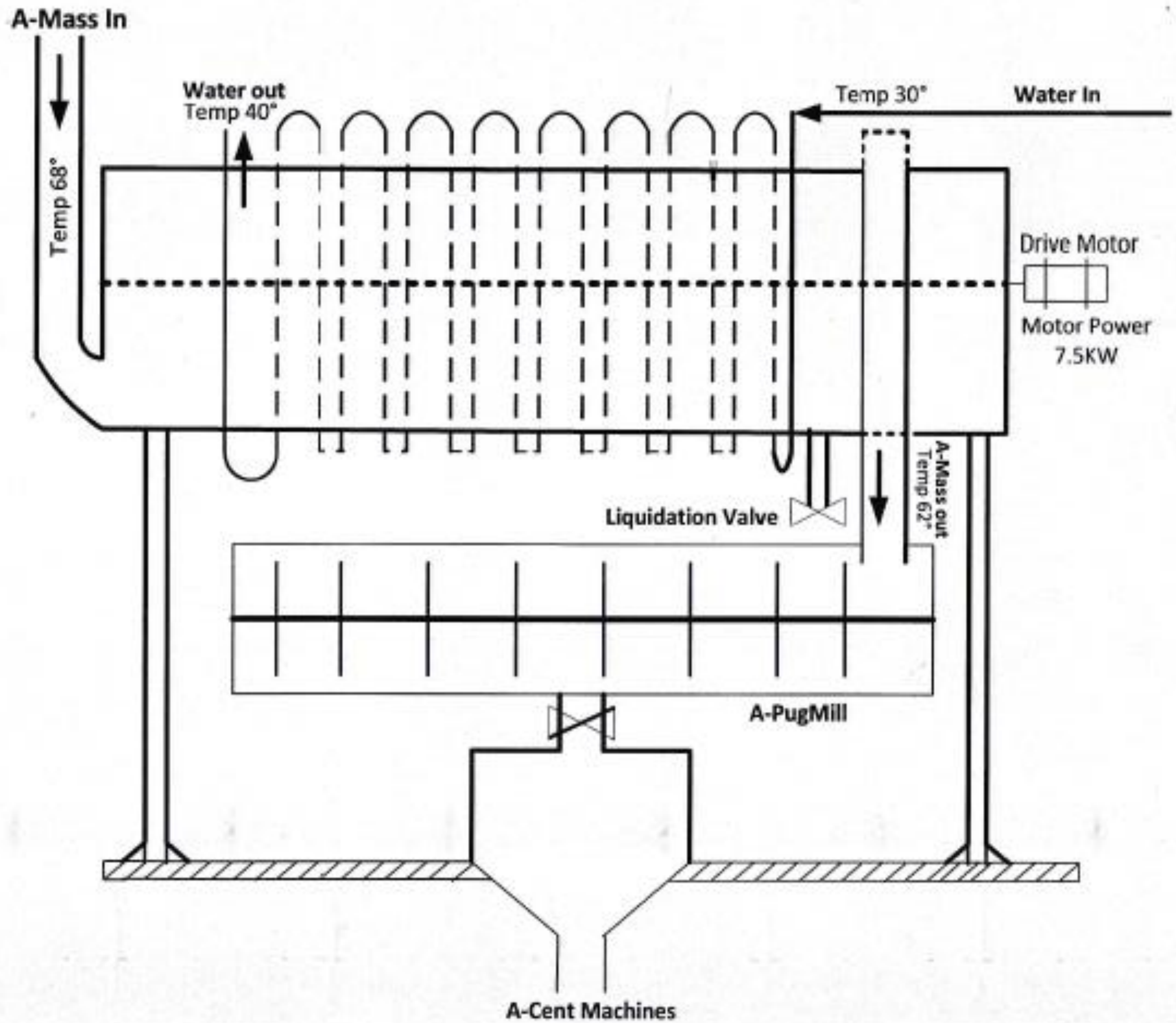


All units = in mm

Note: C vacuum crystallizer of 30M³ lying spare with us modified as a A-Massecuite cooling crystallizer.
Cooling Coils Surface area=33.89M2 (coil Dia 75mm)
A-Massecuite Retention time @7500 TCD=1.6 Hrs

(Exhibit-2)

Overhead A-Mass Cooling Crystallizer Layout



Case Study

Loss of bagasse due to Incomplete Combustion at Boilers

Boiler Data:

Sr#	Description	Boiler #1	Boiler #2	Boiler #3
1	Rated Capacity (Tons/hr)	55	55	60
2	Dumping grate area (m^2)	25.1	25.1	30
3	Furnace height (m)	10.16	10.16	11.67
4	Grate area (m^2) per ton of steam generation	0.456	0.456	0.5

Boiler Data:

Ignition loss of Ash.

Date	Description	Boiler #1	Boiler #2	Boiler #3
27/11/21	Boiler Load(Tons/hr)	42	40	46
	Weight loss % of ash after complete combustion	**46.11**	**39.22**	**19.24**
1/12/22	Boiler Load(Tons/hr)	45	43	51
	Weight loss % of ash after complete combustion	**48.73**	**49.53**	**14.81**
02/12/22	Boiler Load(Tons/hr)	47	41	50
	Weight loss % of ash after complete combustion	**48.31**	**52.57**	**15.57**
Average	Boiler Load(Tons/hr)	44.66	41.33	49.00
	Weight loss % of ash after complete combustion	**47.72**	**47.10**	**16.54**

Procedure:

i. Ash sample was taken from out-let furnace of boiler.
ii. Placed the sample in crucible furnace.
iii. Set the Temp of furnace at 800 •C, after 20 minutes sample was taken out
iv. Loss of ash determination = {(w1 – w2) / w1} x 100
v. Weight the sample as w1.

Exhibit – 1

Loss of bagasse due to Incomplete Combustion at Boilers

Data:

i. Ash % bagasse	=	3% (determined at PSML Lab)
ii. Steam to bagasse ratio	=	2:1

Calculations:

Loss of Bagasse at:

Boiler No 1:	=	(3÷100) x (47.72 ÷ 100) x (44.66÷2)		
	=	0.319 Tons/ Hr		
	=	0.319 x 24	=	**7.67 Tons/day**
Boiler No 2:	=	(3 ÷ 100) x (47.10 ÷100) x (41.33 ÷ 2)		
	=	0.292 Tons/Hr		
	=	0.292 x 24	=	**7.00 Tons/day**
Boiler No 2:	=	(3 ÷ 100) x (16.54 ÷ 100) x (49.0÷2)		
	=	0.1215 Tons/day		
	=	.1215 x 24	=	**2.916 Tons/day**

Observation:

Loss of bagasse at boiler No.1 & 2 is higher than Boiler No. 3 due to:

i. Short in furnace height.
ii. Less furnace grate area/ton of steam generation than boiler No.3.
iii. Manual combustion control.

Final Remarks:

Loss of bagasse at all Boilers can be controlled with fully auto control operation.