بِسْمِ اللَّهِ الرَّحْمَنِ 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.

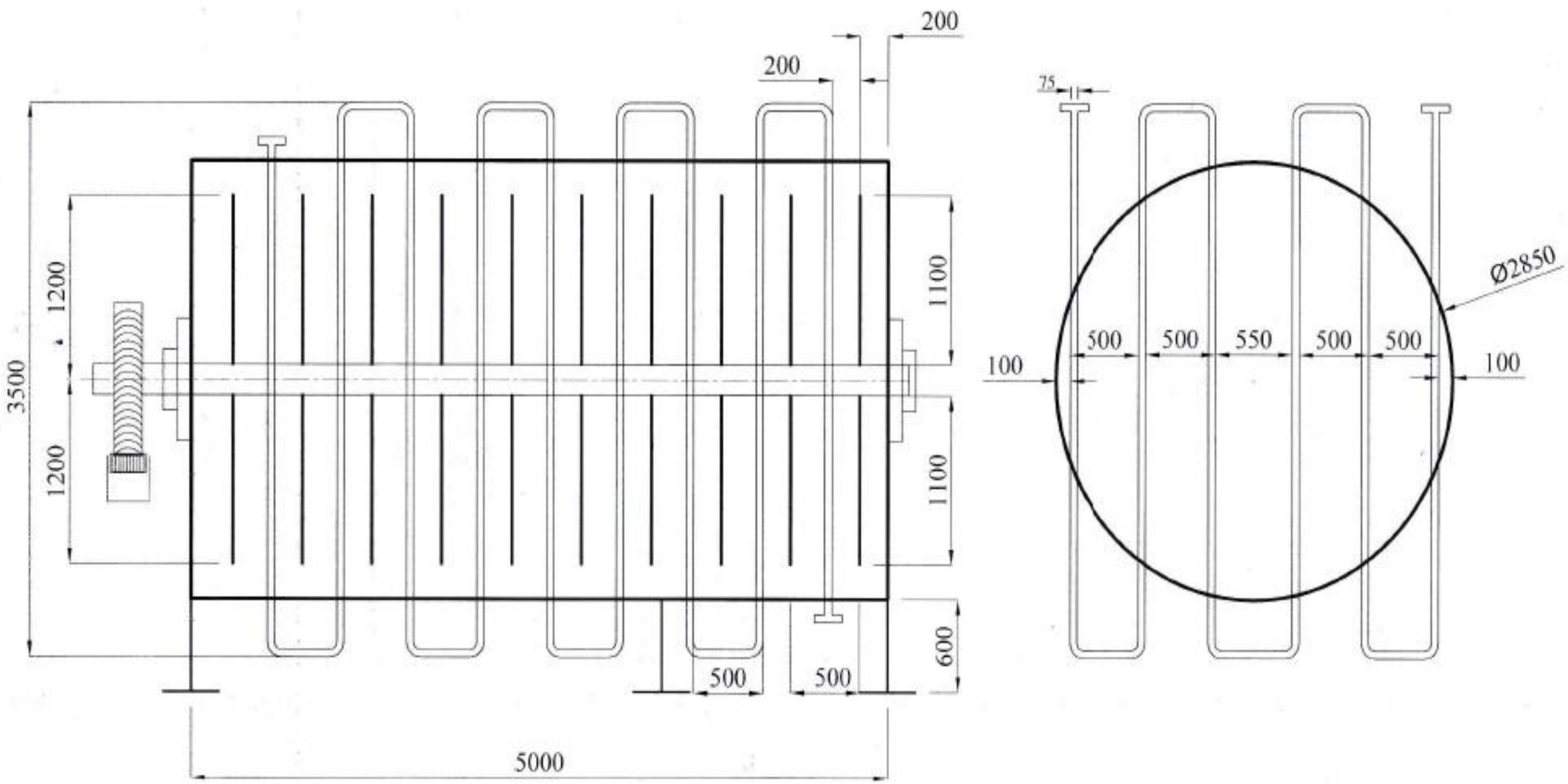
Attachments:

Exhibit - 1 Sketch of A-Massecuite Cooling Crystallizer

Exhibit - 2 Overhead A-Massecuite Cooling Crystallizer

Exhibit - 1

Sketch of A-Massecuite Cooling Crystallizer

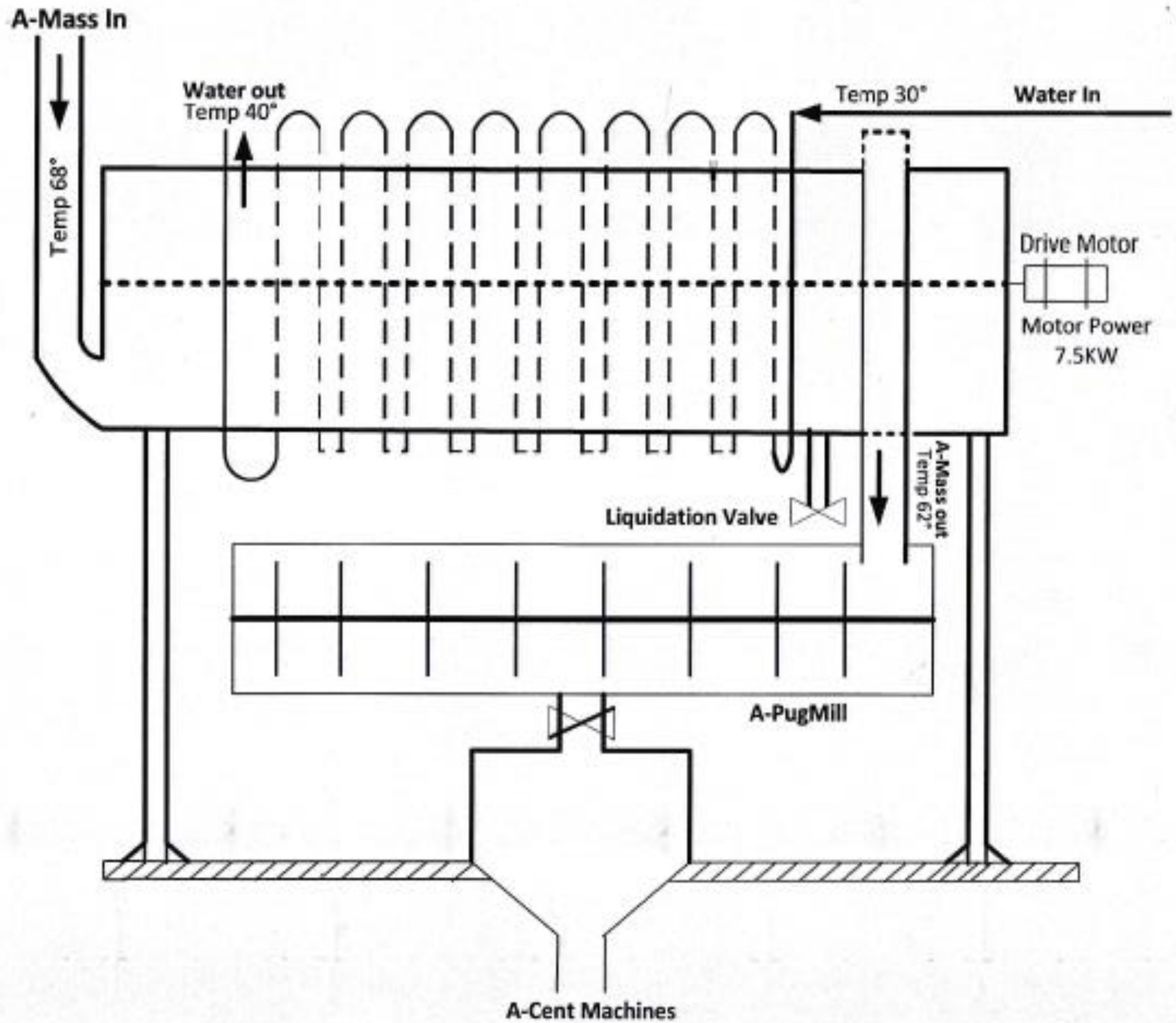


Note: C vacuum crystallizer of 30M³ lying spare with us modified as a A-Massecuite cooling crystallizer.
Cooling Coils Surface area=33.89M2 (coil Dia 75mm)
A-Massecuite Retention time @7500 TCD=1.6 Hrs

All units = in mm

(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.