



#### **A Kaizen Presentation By**

# **Coromandel International Limited, Sarigam**





# **Company Profile**











## **Thrust Area**

#### **Business Aspect**

- Product Selection was done based on the previous year's Production allocation and performance in the markets
- At Sarigam site, Production of Marlett accounts for 80%
- From the product–mix, highest revenue is generated by Marlett (fungicide) due to its high market demand



#### **Business Objective**

- Over 25 Ideas were being collected from shopfloor & multiple brainstorming sessions in Q1'2022-23, out of which 5 of them were approved as feasible by the Idea Review Team.
- Impact Assessment had been carried out for that 1 idea, which was selected to be implemented for this quarter.
- Target was to enhance the operational efficiency and cost reduction.

Sr. No.	Major Pain Areas	Ρ	Q	С	D	S	Μ
1	Frequent tripping of Pin mill due to overload	Y					
2	Weighment variation during bag filling			Y	Y		
3	Frequent chocking of the Rotary Valve				Y		
4	ANF Filter cloth replacement frequency is high		Y				
5	High Replacement frequency of filter bags in Spray Dryer baghouse	Y	Y	Y		Y	Y







## Problem Statement : High Replacement frequency of filter bags in Spray Dryer baghouse

□ Implemented Area : Marlett-A Plant

□ Implementation Date : 17 April 2022

□ Category : Renovation

□ Implementation Team : Marlett Marvels



Sr.	Name	Designation	Role
1.	Mr. Rajesh Samnani	Assistant General Manager	Leader
2.	Mr. Divyesh Makwana	Assistant Manager	Member
3.	Mr. Jignesh Patel	Deputy Manager	Member
4.	Mr. Kapil Chanpa	Officer	Member







## **Problem**

□ Five Days Downtime due to Spray dryer Bags Replacement in every 6 months.

Loss of Two MT Product due to Dusting & Spillage during bag replacement

□ New Filter Bag Cost is very High which will cost around 20 Lacs per set

## 

Due to high replacement

frequency fixed cost is increase.

□ 300 MT Marlett Production loss

during shutdown

- □ 1050 Nos/Year Contaminated
  - Bags generated which will

Increase in Waste generation













# **Process Flow Diagram**



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# Last 5 Year Data Analysis of Spray Dryer Baghouse Replacement

Sr. No.	SAP Code	Last replacement Date	Next Expected Date	Actual replacement Date	Reason of Bag house replace.	frequenc y in Month
1	4245111	01-Jan-18	30-Jun-18	25-May-18	Due to High Differential Pressure across baghouse	4.8
2	4245111	25-May-18	21-Nov-18	19-Oct-18	higher powder deposition in bag surface found during monthly inspection	4.9
3	4245111	19-Oct-18	17-Apr-19	29-Mar-19	During Planned Annual Shutdown	5.4
4	4245111	29-Mar-19	25-Sep-19	03-Aug-19	Due to High Differential Pressure across baghouse	4.2
5	4245111	03-Aug-19	30-Jan-20	30-Jan-20	Schedule replacement.	6.0
6	4245111	30-Jan-20	28-Jul-20	16-Jun-20	During Planned Annual Shutdown	4.6
7	4245111	16-Jun-20	13-Dec-20	13-Dec-20	Schedule replacement.	6.1
8	4245111	13-Dec-20	11-Jun-21	17-May-21	Due to High Differential Pressure across baghouse	5.0
9	4245111	17-May-21	13-Nov-21	01-Nov-21	higher powder deposition in bag surface found during monthly inspection	5.6
10	4245111	01-Nov-21	30-Apr-22	02-Mar-22	Due to High Differential Pressure across baghouse	5.2





- Due to High Differtial Pressure across baghouse
- higher powder deposition found during monthly inspection
- During Planned Annual Shutdown
- Schedule replacement.





**45th Cll National Kai-Zen Competition 2023** 

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# **Data Collection and Trend Analysis**



Spray Dryer Baghouse Differential Pressure 0 Sep-17 Apr-18 Oct-18 May-19 Dec-19 Jun-20 Jan-21 Jul-21 Feb-22 Aug-22 -20 -40 -60 -80 -100 -120 -140 -160

Differential Pressure across baghouse is being monitored through DCS – which gives an indication of deposition on bags and replacement requirement

SPD Baghouse Data								
	Pressure (MMWC)							
Month	Baghous	Baghous	Diff.					
	e inlet	e Outlet	Pressure					
Jan-18	-280	-350	-70					
May-18	-203	-352	-149					
Aug-18	-275	-350	-75					
Dec-18	-255	-358	-103					
Apr-19	-278	-350	-72					
Aug-19	-200	-350	-150					
Dec-19	-260	-348	-88					
Apr-20	-245	-350	-105					
Aug-20	-262	-349	-87					
Dec-20	-220	-351	-131					
Apr-21	-215	-352	-137					
Aug-21	-228	-354	-126					
Dec-21	-275	-347	-72					
Apr-22	-200	-352	-152					







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# Agenda – Ideas to Set Differential Pressure within Limits

Brainstorming done by the Team Marlett Marvels; Mr. Pankaj (Head Production), Mr. Rajesh (AGM-Production), Mr.

Somashekhar (Manager-Maintenance), Mr. Dwarika (Manager-Marlett), Mr. Jignesh (Section Head – Marlett)

Sr. No.	Idea	Feasibility	Reason	ldea Given By
1.	Extending Differential Pressure Limit	Not Feasible	Production Capacity will be reduced	Mr. Dwarika
2.	Operation to be done in scrubber instead of baghouse	Not feasible	It will compromise environment condition	Mr. Somashekhar
3.	Air moisture to be reduce which was passing from filter bags	Not Feasible	Air quantity is very high (30000 m3/hr)	Mr. Rajesh
4.	Filter bags Quality to be change which was running in moist air and decrease the change over frequency	Feasible	Filter Bag is Laminated, with high air permeability & with Antistatic characteristics	Mr. Jignesh





# **Specification Change**



	Old	New
SAP CODE	4245435	4330439
Item Name	Filter Bag - Fibre Glass 5"x4.65m	FILBAGS SPD BAG HOUSE SIZE127X4650MM MRL
Material of Construction	HIGH TEMPERATURE RESISTANCE AND FIRE RETARDANT (HYBRID COMBIFELT) NON WOVEN FILTER BAG WITH UPPER & BOTTOM WEAR STRIP SNAP TYPE MC 950 FB	ANTISTATIC CARBON, PTFE MEMBRANE LAMINATION (STATIC DISSIPATION < 10^9 OHM)
Size	125 MM DIA X 4650 MM LONG	dia 127 x 4650 mm Long
Application	Marlett Spray Dryer Baghouse	Marlett Spray Dryer Baghouse
Air Handling Capacity	60,000 M3/HR	60,000 M3/HR
AIR TO CLOTH RATIO	1.02 M3/MIN/M2	1.42 M3/MIN/M2
TEMP. RESISTANCE (deg. C)	500 deg. C	150 deg. C
Weight	950 GSM	550 GSM
Bulk Density	330 TO 340 KG/M3	330 TO 340 KG/M3
Moisture Handling	12 TO 14 %	12 TO 14 %
Warranty	Six Months	Twelve Months





# **Before**

After





# Old Filter Bag - Fiber Glass

New Filter Bag – PTFE Laminated & Antistatic Bag















								SPD	BAG FI	LTER I	NLET								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520

- Filter bags in SPD baghouse were replaced on 18-April-22
- Using random sampling tools , about 5% bags at various locations (23/520 bags) were inspected by taking them out of cage for –
  - a) Monitoring Differential Pressure
  - b) Physical condition
    - i. Signs of smoldering/fire
    - ii. Physical condition (dry/wet)
  - c) Ease of removal from filter/cage
  - d) Deposition of Marlett layer on the bag





# **Conditional Monitoring**











- ✓ No signs of smoldering or fire on any bags
- Reduced collection of Marlett during baghouse cleaning observed (<100 kg against 1400 – 1500 kg earlier)</li>
- Ease of removal no stickiness or no need of cutting bags
- Consistent pressure drop across baghouse indication of less deposition
- ✓ Much less layer of physical deposition (1-2 mm)









### **Tangible Benefits**

Improvement	Category	Previous	Revised	Usage	Savings
Cost Reduction of Filter Bags	Process Consumables	Rs 3700 – Old Rate	Rs 600 – New Rate	520 Nos	Rs 20 Lacs/ Annum
Reduction of Downtime	Productivity	10 Days/Year	7 Days/Year	180+ MT Saved	Rs 2.5 Crore/Annum
Reduction of Cost	Repair & Maintenance	60000 Rs/Year	30000 Rs/Year		Rs 30000/Annum
Reduction of Cost	Disposal Cost	20000 Rs/Year	10000 Rs/Year		10000 Rs/Annum
				Total	Rs. 2.7 Cr

## **Intangible Benefits**

- Morale of the operators was boosted which led them into believing in their problem-solving skills
- Solid Waste Generation Environment is Reduced





# **Standardisation**



	Integrated Management System Procedure							
	Document type	Standard Operating Procedure						
Coromandel	Document No.	SOP/SMZ/004	Revision No.	01	Page 17			
	Version No.	01	Revision Date	28.04.2021	of 27			
	Department	Production						
Title	Marlett Drying (Marlett Production Plant A)							

- SO<sub>2</sub> & CS<sub>2</sub> parameter to be maintained on ON-LINE analysis at 20 & 30 ppm respectively.
- Bag House, 70-TPD & packing bag house bag replacement to be done in six months at same time change the bellows of ID blower, FD blower, conveying blower and HAG blower.
- Bag house bag replacement work of SPD chamber top lid side area is covered by fire safety ٠ curtains, to avoid dust contact on hot surface of chamber.

#### 5.3.11Interlock of SPD

#### SOP before the change

	Inte	egrated Manag	ement System P	rocedure	
	Document type	Standard Opera	ating Procedure		
Coromandel	Document No.	SOP/SMZ/004	Revision No.	02	Page 17
	Version No.	01	<b>Revision Date</b>	20.12.2022	of 27
	Department	Production			
Title	Marlett Drying (Ma	rlett Production	Plant A)		

- SO<sub>2</sub> & CS<sub>2</sub> parameter to be maintained on ON-LINE analysis at 20 & 30 ppm respectively.
- Bag House, 70-TPD & packing bag house bag replacement to be done in nine months at same time change the bellows of ID blower, FD blower, conveying blower and HAG blower.
- Bag house bag replacement work of SPD chamber top lid side area is covered by fire safety ٠ curtains, to avoid dust contact on hot surface of chamber.

#### 5.3.11Interlock of SPD

#### SOP updated after the change

acult	Vi Tigresupie/ Dag	Income o	J	Manles	t Day	<u>ae</u> c
iafeti	Contact Topic:			Given By:		-
Sr.	Name of the Palticipant	Emp. Code	Grade	Department	Reporting Time	Sin
1	Dwaneshim Petil	10016343	50-1	MORA		P
2	Bhy Pendry Kames	1600.91572	M.J	11	-	B
1	Ravi Rohir	10014101	1-02	1.1		34
4	Prokash F. Parch	10003615	mrG	-	1.1.1	18
.5	Komm Kastli	10039529	51	Det II.		K
-8	Jonesh harfel	perseaal	M-7	M-II	-	-
3	Thresh G tata	100094/29	CE-1	11	- 0	1
-8	Kipil J churps	12014328	51-1-			R
-9	Pickard Sarker	10099543	SU-2	MASG		
10	Mitempertel	10009535	465-1	11		24
.11	2B-B tu	10029441	an	+		G
12						1.1
13						
14					_	12
15				1 11-12	1	
16				-		
.17				100		
.18			-			
19			1.6		10-10-1	
20						

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TRAINING/ MEETING ATTENDANCE

#### **Training & Awareness** Sheet

A = 1 - 1.	Format No	.: SGM/SAD/F065-00
Corronainabat 🗐	COROMANDEL INTERNATIONA (Crop Protection Chemicals	L LIMITED
Rev. Date: 08.12.2021	MOC CHANGE NOTIFICATION FORM	Page 1 of 1

#### Brief description about the change: Based on previous MOC NO: SGM/MNZ/CC/108/22 MOC Extend up to 1 months. (6 to 7 to 8 to 9 Months)

Revise SPD baghouse filter bag replacement frequency - From 8 months to 9 months

Current.acenario - In MNZ A Plant Spray dryer bag house filter bag replacement schedule is 6 Honth. d extend one month by filling MDC No: MOC NO: SGM/MNZ/CC/108/22

Proposed Scenario - As per last 8 Month Evaluation of New type of filter bags antistatic, laminated in SPD dryer filter bag replacement frequency was increase from - 8 months to 9 months. And no deviation found in Bag House Differential Pressure as compared to previous il month, so we are going to extend again 1 months. During this period, we will periodically check the SPD bag house system (alternate day) and if any deviation observed we will change the bag house.

Differential Pressure Data is available in DCA This report is available soft copy from 12/08/22 to 11/11/22. (No difference is found in DP of bag house.) -50 mmwc.

#### One Observation

QF / GN / 37

- No signs of smoldering or fire on any bags
- ✓ Reduced collection of Mancozeb during baghouse cleaning observed (<100 kg against 1400 -</p> 1500 kg earlier)
- Consistent pressure drops across baghouse indication of less deposition -50 MMWC is continue. Much less layer of physical deposition
- Periodically check: Bag inspection, Monitor Differential press reading,

5e. 80	SPD Bug house replaced	Replaced data	Reason	
8	SPD Bag boxe replaced	63-Mar-21	New bug house line up (than 29.01.21 to 03.03.21 ran on scrubber.	
2	SPD Bag house replaced	12-8ep-21	Schedule replacement.	From 3403/21 to 12/09/21 - 10626.250 and.
3	SPD Bug bouse replaced	16-Mar-22	Schedule replacement.	From 12/09/21 to 16/03/22 - 9159.675 mt.
4	SPD Bag house replaced	13-6ep-22	13-04-22	From 16/03/22 to till date = 8183.125 mt.
4	SPD Bag house replaced	12-049-22	12 Nov - 22	From 16/93/22 to 14/10/22 - 9785.975 mt.
5	SPD Big house replaced	12-Nov-22	Dut. Extension again one month (12 Det - 22)	From 16/03/22 to till date (11/11/22) = 11369.775 mt.

	Initiator	Department Head	Production Head / Unit Head				
Name	Mr. Sanjay	Hr. Rajesh	Mr. Pankaj /Hr. Santosh				
Signature	flaten	Fijer P	Waland B.				
Date	13/11/22	13/11/22	13/11/22 251				

#### **Management of Change** Approach







- Horizontal deployment
- U We have checked whether this Idea can be implemented in other plants by using Applicability Matrix
- We have implemented with same strategy at one of our production plant, where the product powder is required to be shifted manually

Month	Title	Category	FPR	Departm ent	Sarigam Plant A - Applica ble	Impleme nted	FPR	Status	Sarigam Plant B - Applicable	Target Comple tion Date	FPR	Status	Dahej Applicable	Target Complet ion Date	FPR	Status	Ankleshwar Applicable
Aug-22	High Replacement frequency of filter bags in Spray Dryer baghouse	Kaizen	Rajesh Samnani	Marlett	Yes	Oct-22	Jignesh Patel	Complet ed	Yes	Dec-22	Dwarika Singh	Complet ed	Yes	Jan-23	Dinesh Pandey	Completed	NA





# **Sustenance Plan – Control Plan**



			Core Team:	Dates of M	eeting	Monthly Every 5 <sup>th</sup> of Month								
Mr. Rajesh Samnani			Marlett Head o	05-Aug-22 Process is in Control										
Mr. Jignesh Patel			Marlett In	05-Se	tal Deployment is									
Mr. Kalpesh Patel			SPD Section		05-00	05-Oct-22 Monitoring Status								
Mr. Hardik Kateshiya			Instrument		05-Nc	05-Nov-22 Horizontal Deployment Dor								
Mr. Abhi Shah		Maintenance Engineer								05-Dec-22 SOP Updated				
					05-Ja	05-Jan-23 Normal Monitoring								
				05-Fe	b-23	Ongoing								
Process Step	Machine Name	Input	Output	Last Maintenance Done	Any Observa tions	Correcti ve Action Done	Preventi ve Action	Who	Where	When	Reaction Plan			
Differential Pressure	Pressure Transmitter	Fine Particals with	Filtered Air	28-Eeb-23	Nii	Nil	Nii	Hardik Kateshiva	0 Mtr	Monthly	Caliberation			
Physical Bag Verification	Spray Dryer Baghouse	Baghouse Powder	Filtered Air	15-Feb-23	Nil	Nil	Nil	Abhi Shah	25 Mtr	Monthly	Inspection Done			
Visual Inspection of Side Door	Spray Dryer Baghouse	Baghouse Powder	Filtered Air	27-Mar-23	Nil	Nil	Nil	Kalpesh Patel	25 Mtr	Daily	_			





## **Kaizen Sheet**



	Integrated Management System Procedure															
1	Document to	ype		rormat  F/TOM//  Revision No.  00  F/TOM//  Revision No.  F/TOM//  F/TOM//  Revision No.  F/TOM//  F/TOM//  Revision No.  F/TOM//  Revision No.  F/TOM//  F/TOM//  Rev												
Coromandel 候 🧲	Version No.			00		-					Page	e 1 of 1				
FUTURE POSITIVE	Department			Total Quality Manag	ement								-			
Title	Kaizen Shee	t.		Kaizen-Idea	Sheet	ocation	Date 01/08/2022	Kaizen No.								
	Do it: Ever	y Cartie		Kaizen-Rica Sheet					1	dentified On						
Productivity Quality	Delivery	Cost	Safety	Morale Environment	Comment of I Implemented Rejected	SARIG	АМ	01/12/2022								
	$\sim$	~			$\checkmark$			[	In	plemented On						
Kaizen Title : Filter bag replac	ement frequency	reduction in Ma	ancozeb A Spra	y Dryer baghouse			Department			S	PD Bagh	ouse				
Problem/Present Status				Before Improvement (Pic	cture)		Location	r I	I	Poka Yoke / Mistake P	Sarigan	$\frac{1}{\sqrt{2}}$	/			
Recommendation from last fire	incident in Plant	B Baghouse (J	an'22)	Belore Improvement (1 a						oku Toke / Mislake I	1001 (	/	•			
Evaluation of new type of filter Reduced incidents of smolder	· bags – antistatic ng/fire	, laminated with	n purpose of					Prevent Error	( ) ~	Shutdown - Cl	osing, Loo	king, Tr	ipping			
Improved replacement frequer Reduced fixed cost Reduced downtime & cost for	replacement	nonths)						Detect Erro	Contro		ol - Regular , Check					
					Prove I				. ,							
										Alarm- signs like		like sound, light				
Real Root Cause Identification																
Filter bags in SPD baghouse w	ere replaced on 1	8-Mar-22 during	9 ATA	After Improvement (Picture)					Results/Benefits							
Post 5 months, about 5% bags	at various locatio	ns (23/520 bags)	) were inspected	Reduced collection of Mancozeb during baghouse cleaning observed (<100 kg against 1400 - 1500 kg					Qualitative				Quantitative			
by taking them out of cage for	-		1	earlier) Ease of removal – no stickiness or no need of cutting bags					Less chances of deposition related incidents				SPD Baghouse Data Pressure (MMWC)			
Physical condition Signs of smoldering/fire													Baghouse Outle	Diff. Pressure		
Physical condition (dry/wet)				Consistent pressure drop	across baghouse - indication of les	Less (low AI) powder management from SPD – Improved FTPR			April May	-385 -390	-280 -290	-105				
Ease of removal from filter/cag	je –			Much less layer of physic	cal deposition (1-2 mm)				June	-390	-280	-110				
Deposition of Mancozeb layer	on the bag					Reduced repla	July-2 Week	-375	-285	-90						
								12 hours for cl	hangeover	to scrubber, 8 days'	July-3 Week	-385	-290	-105		
								operation on s Reduced cost	crubber of filters (F	s 800 x 520 = 4.2	July-5 Week August	-380 -380	-275 -280	-105 -100		
								lacs) Reduced R&N	A cost duri	ng replacement work						
								Reduced dispo	osal cost of	used bags						
								Better monitor	ing through	predictive techniques						
								Standardizatio	n							
								Standardizatio								
Root Cause				Deposition of Mancozeb layer on the bag					DP is being monitored through DCS – which gives an indication of deposition on bags and replacement requirement							
									Limit opingie for find DD hefers conferenced shall be done is addition with somethic increase							
Idea to Eliminate				Use of predictive instrument/techniques Use of DP sensors to understand chocking Use of thermal imaging camera for locating hot spots					Lana craera for anal DP before replacement shall be done in addition with monthly inspection							
Countermeasures			Use on	Jy M/S Khosla make filter bags for better reliability & performance					w many pla	ces this kaizen can be c	leployed ł	orizontal	lly & total be	enefits		
R&R	1			ICAR	ERecognised			-								
Name	DHARMEND HITESH B PA	RA SINGH, D TEL, Gaurang	C Kawade, Moudi	Approved By (Name &				This Kaizen could be easily deployed at places where the product powder is going off-spec in terms of Colour Quality and overall A1 % purity.								
Signatura	1			signature)					-							











This Kaizen is Recognized as The Gamechanger Idea by Our Executive Vice Chairmen – Mr. Arun Alagappan



# The Spirit of the Murugappa Group

These **five lights** guide us as we navigate through professional and personal decisions. The light of

that gives us the courage to always do the right thing

# RESPONSIB LITY

that gives us the humility to think about the world around us The light of PASSION that provides us with the desire to win

The light of The SPECT that inspires people around us to perform

Which makes us dream of excellence

The light of

Thank You

