
LT Air Engineering Pte ltd
Business Presentation

Our Founder (Gallen Tan)

- With a Chemical Engineering and Environmental Management background, Gallen has designed, supplied and commissioned numerous air emission control systems for the past 20 years.
- He is also involved in many major local projects in both private and public sectors; and has led teams to commission projects overseas including Taiwan, Indonesia and Sri Lanka.
- Currently he is also sharing his knowledge with the younger generation by teaching the module - Sustainability and Climate Action, in a local tertiary institution.

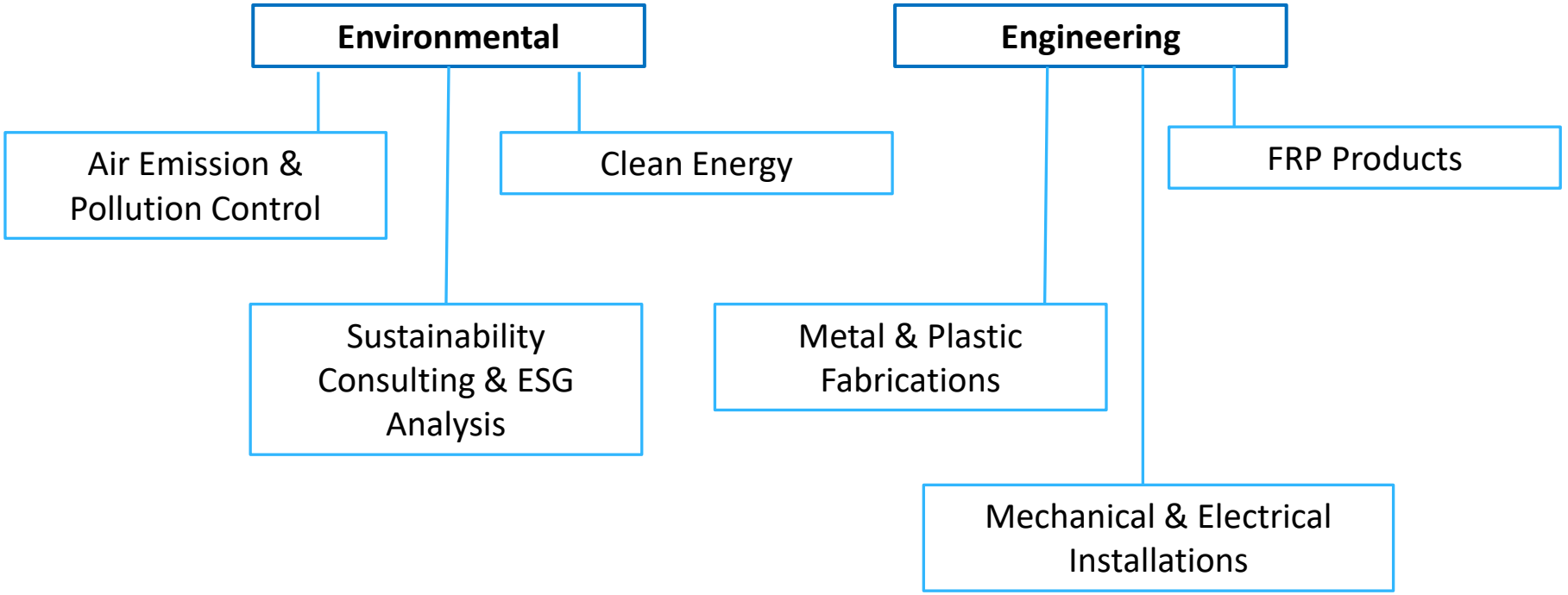
❖ **MSc (Environmental Management)**
National University of Singapore

❖ **B.Tech in Chemical Engineering (Honours)**
National University of Singapore

❖ **Director**
LT Air Engineering Pte Ltd

❖ **Adjunct Lecturer**
Temasek Polytechnic
Sustainability and Climate Action

Business Overview



Business Overview

Air Emission & Pollution Control

We provide turnkey solution for abatement systems including:

1. Wet Scrubbers

- Horizontal crossflow and vertical counter-current configurations

2. Activated Carbon Filters

- Horizontal and vertical deep bed configurations as well as V-bank configurations

3. Project Consultancy Service

Why LT Air Engineering?

1. 20 years of experience in emission control

2. Our scrubbers and activated carbon filters are custom-designed to each project's requirement

3. Field-tested robust instruments and equipment

4. All systems backed by process calculations

5. Delivered with QC test report for piece of mind

6. NEA submission with 100% approval record

Backed by calculations…

1.0 Design Basis

Air Flowrate	=	34,000	ACMH			
	=	566.666667	ACMM	=	9.44	ACMS
Inlet Air Temperature	=	30	Deg C			
Inlet Acid Concentraion						
HCl	=	7.40	mg/Nm3	=	5.04883	PPM
HF	=	4.10	mg/Nm3	=	5.099523	PPM
H2SO4	=	20.00	mg/Nm3	=	5.072538	PPM
Cl2	=	0.00	mg/Nm3	=	0	PPM
HNO3	=	0.00	mg/Nm3	=	0	PPM
H3PO4	=	0.00	mg/Nm3	=	0	PPM
HBr	=	0.00	mg/Nm3	=	0	PPM
Outlet Acid Concentration						
HCl	=	0.15	mg/Nm3	=	0.100977	PPM
HF	=	0.08	mg/Nm3	=	0.10199	PPM
H2SO4	=	0.40	mg/Nm3	=	0.101451	PPM
Cl2	=	0.00	mg/Nm3	=	0	PPM
HNO3	=	0.00	mg/Nm3	=	0	PPM
H3PO4	=	0.00	mg/Nm3	=	0	PPM
HBr	=	0.00	mg/Nm3	=	0	PPM
Removal Efficiency	=	98	% for all the above except Cl2			
Selected Liquid Rate, L	=	12	m3/m2.h			
Relative Humidity	=	60	%			

2.0 Sizing

Design Velocity	=	2.5	m/s		
Effective Cross-Sect Area	=	9.44	/	2.5	
	=	3.78	m2		
Calculated Scrubber Diameter	=	2.19	m		
Selected Scrubber Diameter	=	2.20	m		
Overall Scrubber Height	=	6.00	m		
Selected Cross-Sect Area	=	3.80	m2		

5.0 Recirculation Rate

Recirculation Rate	=	12	*	3.80		
	=	45.62	m3/h		760.364	LPM

6.0 System Pressure Drop

Across Packing	=	164.04	Pa/m		
	=	164.04	*	1.8	
	=	295.28	Pa		
Across Demister	=	162.00	Pa		
Total Pressure Drop	=	457.28	Pa		

7.0 Chemical Dosing Rate

Selected Scrubbant = 45% NaOH

a Neutralisation Reaction = HCl + NaOH ⟶ NaCl + H2O

Molar Flowrate of HCl =

$$\frac{34{,}000\ \text{CMH} * 5.0488305\ \text{PPM} * 273.15\ \text{K}}{0.0224\ \text{m3/gmol} * 1{,}000{,}000 * 303.15\ \text{K}}$$

= 6.91 gmol/h

Volumetric Flowrate of 45% NaOH

=	6.91	*	1	*	40	/	0.45
		=	613.780094	g/h			
		=	0.41	l/h			

b Neutralisation Reaction = HF + NaOH ⟶ NaF + H2O

Molar Flowrate of HF = 6.97 gmol/h

Vol. Flowrate of 45% NaOH = 619.94 g/h = 0.42 l/h

c Neutralisation Reaction = H2SO4 + 2NaOH ⟶ Na2SO4 + 2H2O

Molar Flowrate of H2SO4 = 6.94 gmol/h

Vol. Flowrate of 45% NaOH = 1233.32 g/h = 0.83 l/h

… and QC test report

Refer standard : ASME RTP-1-2023; clause 6-920; Figure 4-1

Note: All dimension is measured in unit (mm).

SHELL DIMENSION

ITEM DESCRIPTION	INTERNAL DIAMETER			INTERNAL HEIGHT			INTERNAL WIDTH			INTERNAL LENGTH		
	REQ'D	ACTUAL	(D)+ -	REQ'D	ACTUAL	(D)+ -	REQ'D	ACTUAL	(D)+ -	REQ'D	ACTUAL	(D)+ -
SUMP TANK	-	-	-	700	700	0	1200	1202	+2	2000	2000	0
SHELL	-	-	-	1000	1000	0	600	600	0	2350	2351	+1

ACCESSORIES DIMENSION

DESCRIPTION	PROJECTION			ELEVATION			ORIENTATION/X-AXIS			RADIUS/ Y- AXIS		
	REQ'D	ACTUAL	(D) + -	REQ'D	ACTUAL	(D) + -	REQ'D	ACTUAL	(D) + -	REQ'D	ACTUAL	(D) + -
MW,Ø1"	-	-	-	-	-	-	100	101	+1	400	400	0
LS,Ø2"	-	-	-	-	-	-	100	102	+2	100	101	+1
VP1, 1200X150	100	100	0	1660	1661	+1	1100	1102	+2	-	-	-
VP2, 1200X150	100	101	+1	1660	1661	+1	1100	1101	+1	-	-	-
HH, 200X300	50	53	+3	-	-	-	1000	1000	0	-	-	-
PH, Ø1/2"	-	-	-	-	-	-	100	102	+2	400	401	+1
DS, Ø1"	-	-	-	-	-	-	100	101	+1	100	100	0
D,Ø2"	100	102	+2	90	89	-1	-	-	-	-	-	-
MH, 600X800	100	103	+3	1165	1166	+1	1500	1500	0	-	-	-
DC 200 x 400	100	102	+2	1165	1165	1165						
NAME PLATE	-	-	-	1225	1227	+2						
DPH	-	-	-	1400	1400	0						
AIR INLET	200	200	0	1160	1160	0						
AIR OUTLET	200	200	0	1160	1162	+2						

REMARKS : N/a

NO.	DESCRIPTION	DESIGN (mm)	WALL THICKNESS MEASURED (mm)				AVERAGE (mm)	STATUS	
								ACC.	REJ.
SUMP TANK									
1	BASE	8.00	9.39	9.11	9.40	9.82	9.43	✓	
2	SHELL (D)	8.00	10.56	10.70	10.6	10.63	10.62	✓	
3	ROOF (HH)	8.00	9.41	9.52	9.63	9.48	9.51	✓	
SCRUBBER BODY									
1	SHELL (VP1)	8.00	8.46	8.71	9.81	9.06	9.01	✓	
2	SHELL (VP2)	8.00	9.38	9.15	8.87	9.82	9.31	✓	
3	SHELL (MH)	8.00	8.76	9.09	8.92	9.26	9.01	✓	

NO.	DESCRIPTION	MINIMUM VALUE	BARCOL HARDNESS VALUE					STATUS	
								ACC.	REJ.
SUMP TANK									
1	BASE	29	49	53	52	56	60	✓	
2	SHELL (D)	29	40	42	46	43	44	✓	
3	ROOF (HH)	29	54	49	50	47	46	✓	
SCRUBBER BODY									
1	SHELL (VP1)	29	42	46	53	42	48	✓	
2	SHELL (VP2)	29	42	48	59	47	43	✓	
3	SHELL (MH)	29	47	54	43	55	52	✓	

Air Emission & Pollution Control

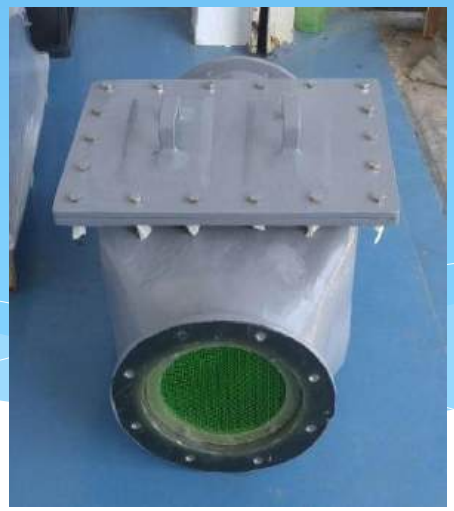
Horizontal Cross-Flow Scrubber System

Vertical Counter-Current Scrubber System

Mini Scrubber System for cleanrooms & laboratories

Activated Carbon Filter System

- **V-Bank configuration**
- **Horizontal / Vertical Deep-Bed configuration**
- **Inline Duct configuration**



Combined Systems for a waste treatment plant

Business Overview

Sustainability Consulting & ESG Advisory

1. Analysis & Report

- Sustainability strategies and policies setting
- ESG consulting and gaps analysis
- Materiality assessment, reporting and recommendations
- Identify risks & opportunities
- Align with relevant frameworks & standards - UN SDGs, GRI and SG Green Plan

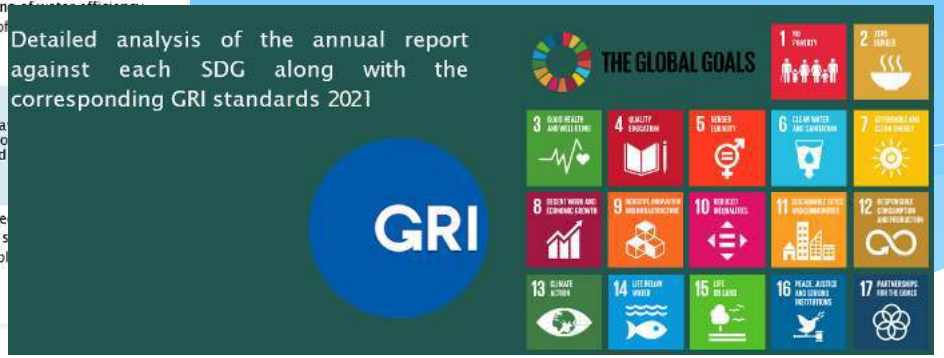
2. Advisory

- Awareness talk & training seminar
- Sustainability practices for your organisation
- Air emissions and odour control system detail design
- Solar photovoltaic system detail design and monetising of the PV system

ESG Consulting & Advisory

ESG Analysis Report for an Oil & Gas Company

SDGs	Areas of Strength	Existing Gaps	Areas for Development
5	• Provide transparently about company data divided by gender	• Company indicates only quantitative data. • Lack of female participation in the company	• Promote discrimination, violence, trafficking, against women and girls in the operations • Recognize the unpaid worker with provisions
6	• Tracking of consumption of water and sewage discharge	• Quality criteria for discharge, mitigation actions for discharge, disclosure of processes for impact assessment, • Tracking consumption of water from water stress areas. Accounting for freshwater/other water intake,	• Improving water data disclosure and monitorin and impact of
7	-	• Pursuit of renewable energy alternatives or reducing current fuel/energy sources. • Energy efficiency or consumption disclosures	• R&D into transition awa • Efforts in mo efficiency and
8	• Employee training, policy to support local communities, business and jobs- HSSE framework and workers rights • Supplier no-gift policy	• Strengthening the HSSE framework • Enhancing policy to work with locals/SMEs • Proper supplier assessment criteria/framework	• Tracking the e outcomes of s • Supplier/empl or ethics



Business Overview

FRP Products

We manufacture a wide range of fibreglass products, serving practically all industries and residential homes. Common products include:

1. Water and Chemical Storage Tanks

2. Dilution Tanks

3. Ducts, Pipes, Fittings and Dampers

4. Enclosures

FRP Products

Decomposer Tank

Skidded
Mixing Tanks

Waste Water Holding Tank

FRP Chemical Storage Tanks with Customised Steel Skid and Platform

FRP Dilution Tanks

FRP Ductings, Dampers and Fittings

FRP Enclosures

FRP Cable Trays for Vessels

FRP Motor Covers

Business Overview

Metal & Plastic Fabrications

Tie-up with partner businesses in a strategic network to offer a one-stop solution to clients for their project and fabrication needs including:

1. Steel Skids and Structures

2. Steel Housings

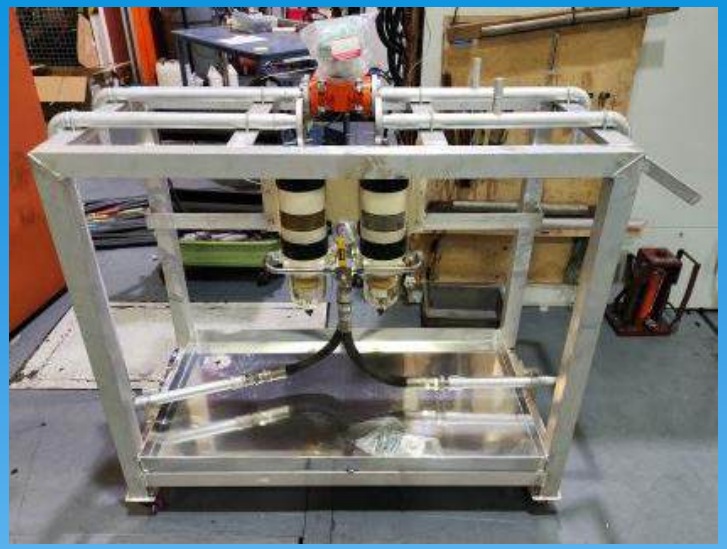
3. Customised Work Desk Trolleys

4. Customised Ducts, Adapters and Silencers

Metal & Plastic Fabrications

FRP-lined Steel Skids

Galvanised Steel Housing



Customised Aluminium Trolley

Galvanised Steel Silencer

Galvanised Steel Structure

PP Damper and Ducts

PVC Tanks and Testing Apparatus

Business Overview

M&E Installation

1. System Design & Installation

- Chemical transfer, dosing, exhaust, ventilation, storage tank, silencer

2. Ducting and Piping Design & Installation

3. Electrical Work

4. Epoxy / FRP Floor Lining

SS304 Flexible Ducting System

Steel Exhaust Ductings with Silencer and Certified Structure

PP Exhaust Ductings and Stack

Floor Levelling with Epoxy Lining

240 mm^2 Cables Installation

Total Length: ~2 km

Selected Project References (Air Emissions & Pollution Control)

End User / Client	Project Description	Year of Completion	Location
A*STAR Research Entities	Design, fabricate, supply, install, test & commission: 2,500 CMH ammonia scrubber x 2 units	2025	Singapore
STM / Hitachi Plant Services	Project consultant for 70,000 CMH HCl scrubber x 2 units	2024	Singapore
Technetics Group	Design, fabricate, supply, install, test & commission: 2,160 CMH acid scrubber system x 1 unit	2023	Singapore
SSMC Pte Ltd	Consultant for VOC abatement system project	2022	Singapore
SSMC Pte Ltd	Project consultant for 22,100 CMH ammonia scrubber includes design calculations and authority submission	2021	Singapore
Veolia ES Singapore Industrial Pte Ltd	Design, fabricate, supply, install, test & commission: 3,000 CMH acid scrubber system x 1 unit 2,000 CMH VOC scrubber system x 1 unit 2,000 CMH VOC activated carbon filter system x 1 unit	2019	Singapore
Belfor (Asia) Pte Ltd	Design, fabricate, supply, install, test & commission: 600 CMH activated carbon filter	2018	Singapore
AMS Sensors Asia Pte Ltd	Design, fabricate, supply, install, test & commission: 5,100 CMH acid scrubber system x 1 unit 2,300 CMH caustic scrubber system x 1 unit 2,900 CMH solvent activated carbon filter system x 1 unit	2018	Singapore
FRP Pollution Engineering Sdn Bhd	Project consultant for 18,000 CMH acid scrubber system includes design calculations and ductwork sizing	2017	Malaysia
Orapi Applied (S) Pte Ltd	Design, fabricate, supply, install, test & commission: chlorine scrubber system	2017	Singapore
Chemical Industries (Far East) Limited	Consultant for chlorine scrubber validation	2017	Singapore
Pesu Asia Pte Ltd	Design, fabricate, supply, test & commission: 800 CMH ammonia scrubber system	2016	Singapore
Mitsubishi Heavy Industries Engine System Asia Pte Ltd	Supply, install, test & commission: 40,140 CMH SCR system for NOx	2016	Singapore
Prima Group	Design, fabricate, supply, test & commission: 2,700 CMH chlorine scrubber system	2015	Sri Lanka
Yale-NUS College	Design, fabricate, supply, install, test & commission: 5,400 CMH acid scrubber system x 2 units 5,400 CMH V-bank activated carbon filter system x 2 units 16,200 CMH acid scrubber system x 1 unit 16,200 CMH V-bank activated carbon filter system x 1 unit	2014	Singapore

Certification

WSHCOUNCIL
Tripartite Alliance for Workplace Safety and Health

Date of issue: 03/11/2023

bizSAFE

CERTIFICATE

The Workplace Safety and Health Council
is pleased to certify that

LT AIR ENGINEERING PTE. LTD.

has fulfilled the requirements to attain bizSAFE Level 4

This certificate is valid till 02/11/2026

Christopher Koh
General Manager
Workplace Safety and Health Council

Thank You

Think environment, Think LT Air

Company Registration No. 201707180Z

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