WHITE PAPER

Advanced Fume Scrubbing System for Agrochemical Processing

Dueltron System Integration (Pty) Ltd
Dust Extraction and Pressurisation Systems (DEPS)

Project Title: Advanced Fume Scrubbing System for Agrochemical Processing
Client: Confidential – Leading Agrochemical Manufacturer
Project Lead: Dueltron System Integration (Pty) Ltd
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Executive Summary

Dueltron System Integration (Pty) Ltd was commissioned to design, supply, install, and Commission a high-efficiency fume scrubbing system for a leading agrochemical Manufacturer.

The facility required an advanced extraction solution capable of capturing hazardous Fumes generated from process tanks and shredding equipment while maintaining stable Production conditions and environmental compliance.

Dueltron delivered a fully integrated solution centred around a desc 1800-5 packed bed Scrubber manufactured from 304 stainless steel. The system was engineered to handle a Total extraction volume of 3.8 m^3/s while maintaining stable airflow and efficient Contaminant removal.

A Mitsubishi Electric FX5 PLC, programmed in-house by dueltron automation systems, Provided intelligent process control, automated reticulation management, and operational Monitoring.

The completed system delivered:
- Improved operator safety
- Enhanced environmental compliance
- Stable extraction performance
- Reduced maintenance requirements
- Reliable long-term operation

This project demonstrates Dueltron's ability to deliver integrated environmental and Automation solutions for demanding industrial applications.

1. Introduction

Agrochemical manufacturing processes generate airborne contaminants including fumes, Vocs, corrosive gases, and particulates that require controlled extraction and treatment Before atmospheric discharge.

The client required a reliable extraction and scrubbing solution capable of:

- Capturing hazardous contaminants directly at the source
- Maintaining balanced airflow conditions
- Preventing excessive extraction losses
- Improving operator safety
- Supporting environmental compliance

Dueltron deps designed a complete environmental control solution integrating extraction Engineering, packed bed scrubbing technology, reticulation systems, and industrial Automation.

2. Project Objectives

The project was developed to achieve the following operational and environmental Objectives.

Source capture efficiency
Capture airborne contaminants directly from processing equipment before dispersion into The working environment.

Environmental compliance
Reduce harmful emissions and support long-term compliance with environmental and Safety regulations.

Operational reliability
Provide stable continuous-duty extraction performance suitable for demanding industrial Operation.

Process protection
Prevent excessive extraction that could negatively affect production efficiency or product Integrity.

Reduced maintenance
Implement automated cleaning and reticulation systems to reduce maintenance Requirements and downtime.

3. System Design and Engineering

The solution combined industrial extraction engineering, airflow balancing, packed bed Scrubbing technology, and intelligent automation into one integrated environmental Control system.

3.1 Packed Bed Scrubber System

The system was centred around a desc 1800-5 packed bed scrubber manufactured From 304 stainless steel.

The scrubber was engineered to efficiently remove airborne contaminants using Liquid-based particulate and gas absorption technology while maintaining reliable Continuous-duty operation.

Technical Specifications

Parameter	Specification
Scrubber Model	DESC 1800-5
Construction Material	304 Stainless Steel
Airflow Capacity	3.8 m^3/s
PLC Platform	Mitsubishi Electric FX5
Fan System	Industrial Centrifugal Extraction Fan

Key Features

- Corrosion-resistant stainless steel construction
- Packed bed contaminant absorption
- Continuous-duty industrial operation
- Automated liquid circulation system

Reticulation pump and circulation system supporting continuous scrubber operation and contaminant treatment.

3.2 Airflow and Extraction Management

The extraction system was engineered to maintain stable airflow while effectively Capturing airborne contaminants generated during processing operations.

Custom ducting and extraction layouts ensured efficient contaminant transport and Balanced airflow throughout the system.

Balanced airflow control prevented product loss while maintaining effective contaminant Capture throughout the process.

System Features

- Source-capture extraction
- Balanced airflow design
- Industrial ducting integration
- Stable extraction performance

Complete extraction and ducting system installed for shredder fume capture and airflow management.

3.3 Cyclonic Separation System

A cyclonic pre-separation system was incorporated to remove larger particulate before Final-stage scrubbing.

The system improved contaminant separation efficiency while reducing loading on Downstream equipment.

Key Features

- High-efficiency particulate separation
- Reduced downstream loading
- Heavy-duty industrial construction
- Low maintenance operation

3.4 Water Reticulation and Process Circulation

A dedicated recirculation system was implemented to support efficient contaminant Scrubbing and controlled liquid management.

The reticulation system was designed for corrosion resistance, operational reliability, and Simplified maintenance.

Closed-loop reticulation significantly reduced water consumption while maintaining stable Scrubbing performance.

- Reticulation features
- Automated liquid circulation
- Corrosion-resistant pipework
- Controlled liquid management
- Reduced water consumption

Stainless steel reticulation and process piping supporting contaminant treatment and reliable long-term scrubber operation during system use.

3.5 Control and Automation System

The complete automation system was developed and programmed by dueltron Automation systems.

The control system provided:
- Automated startup and shutdown sequences
- System monitoring
- Alarm management
- Fan and process control
- Maintenance functionality

Integrated plc automation reduced operator intervention while improving operational Reliability and system safety.

The mitsubishi electric fx5 plc platform ensured reliable operation and simplified Long-term maintenance support.

3.6 Mist Elimination and System Maintenance

The system incorporated automated cleaning functionality to maintain mist eliminator Performance and minimise operational buildup.

Automated cleaning functionality reduced maintenance requirements and improved Long-term equipment reliability.

4. Implementation and Commissioning

The project included complete fabrication, installation, commissioning, airflow balancing, And performance verification.

Dueltron engineers completed onsite testing and commissioning to ensure stable Operation, balanced extraction performance, and reliable system integration.

The system was fully tested under operational conditions before final client handover.

Implementation Activities

- Equipment installation
- Ducting integration
- PLC programming
- Airflow balancing
- Functional testing
- Operator handover

Control panel commissioning and VSD parameter configuration performed during final system startup.

5. Results and Benefits

The completed system delivered measurable operational and environmental Improvements.

Achieved results

- Improved operator safety
- Enhanced environmental compliance
- Reliable contaminant extraction
- Reduced maintenance requirements
- Stable continuous-duty operation
- Improved process visibility
- Efficient automated control

Complete industrial wet scrubber system designed and commissioned for hazardous fume extraction and treatment.

6. Conclusion

The successful implementation of the advanced fume scrubbing system demonstrates Dueltron's ability to deliver integrated environmental and automation solutions for Demanding industrial applications.

By combining:

- Airflow engineering
- Packed bed scrubbing technology
- Intelligent automation
- Industrial process integration

Dueltron delivered a reliable turnkey solution engineered for long-term industrial Performance, operational safety, and environmental compliance.

About Dueltron System Integration (Pty) Ltd

Dueltron delivers integrated environmental and automation solutions, including dust extraction, fume control, industrial ventilation, electrical panels, and automation systems. Our multidisciplinary teams engineer high-performance systems designed for safety, reliability, and efficiency.

Disclaimer

This document is provided for informational purposes only. System specifications, materials, and performance characteristics are project-specific and may vary.