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ROPERHURST FUME SCRUBBER CASE STUDIES

Introducing Roperhurst

Roperhurst is a UK in-house designer, manufacturer and installer of fume and odour control treatment plant and equipment, chemical storage vessels, dosing and delivery systems.

Roperhurst was founded in 1976. We are fast approaching 50 years of continuous trading and sustainable growth, closely working year-in, year-out, with a range of customers, big and small, global and local, on specialist plastic and environmental engineering projects.

Roperhurst is one of the few plastic ductwork specialists with its own in-house fibre-glass division, and specialist installation and testing teams. This means that we do not rely on sub-contractors to complete elements of the project, which can cause quality and compliance issues. Our plastics fabricator welders are time served certified to BS EN 13067; all our laminators have been assessed under BS 4994.

Roperhurst in 2015, following a sustained period of growth, the company relocated to new larger premises which allowed for investment in leading edge plastic fabrication technology, including a 4m butt welding machine, a CNC machine, a multi-wire hot line bender, as well as providing a modern environment for its growing workforce.

Roperhurst investment in scale and technology meant the company could take on more challenging projects, moving us away from many companies we might previously have considered competitors.



ROPERHURST CASE STUDIES

P12794 Potassium Cyanide.

Design, fabricate, supply and install an integrated 5,000m³/hr capacity Potassium Chloride fume treatment system.

PVC/GRP vertical counter-flow scrubber unit Roperhurst in-house design and build model VRP/1220/2500/NP. Complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch.

All were specifically designed and built as a bespoke solution, with supply, installation and commissioning completing and meeting the programme of works.



P12661 Aluminium Chloride.

Design, fabricate, supply and install an integrated PVC/GRP Aluminium Chloride powder control and treatment 6,300m³/hr capacity system, including Local Control Panel, 15kW centrifugal duty/standby fan set and discharge stack

The PVC/GRP vertical counter-flow scrubber unit is Roperhurst in-house design and built model VRP/1200/1750/NP. This unit offers pH monitoring and is complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch, pH by-pass completed with isolation valve, probe holder and flow rate control valve.



ROPERHURST CASE STUDIES

P12636 Chromic Acid

Design, fabricate, supply and install an integrated PVC/GRP chromic acid fume control and treatment 38,588m³/hr capacity system, including Local Control Panel, inverter-controlled 37kW centrifugal plastic fan and free-standing discharge stack.

The PVC/GRP vertical counter-flow scrubber unit is Roperhurst in-house design and built model VRP/2600/1830/NP. This unit offers pH monitoring and is complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch, pH by-pass completed with isolation valve, probe holder and flow rate control valve.



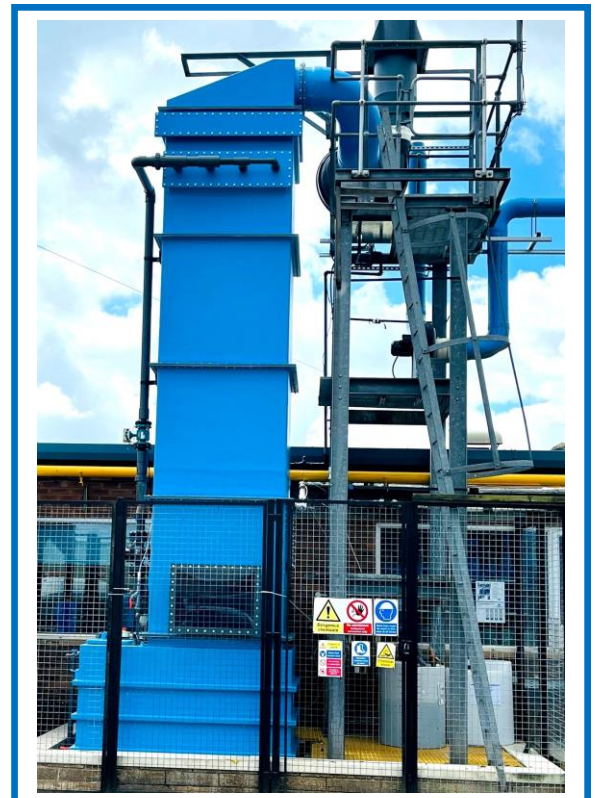
P11802 NOx

Design, fabricate, supply and install an integrated PVC/GRP NOx control and treatment 4,000m³/hr capacity system, including Local Control Panel, inverter-controlled 4.0kW centrifugal duty plastic fan and free-standing discharge stack.

The PVC/GRP vertical counter-flow scrubber unit Roperhurst model VRP/1220/1220/RNP. This unit offers pH monitoring and is complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch, pH by-pass completed with isolation valve, probe holder and flow rate control valve.

All were specifically designed and built as a bespoke solution, with supply, installation and commissioning completing the scope of works in accordance with the programme of works.



ROPERHURST CASE STUDIES

P11365 Acid/Alkali

4,750m³/hr VRP/1060/2100/NP scrubbing unit type vertical counter-flow suitable for mounting at floor level on a specially prepared concrete plinth (by others) to allow total sump drainage.

The scrubbing unit is complete with integral liquor holding tank reservoir, gas inlet connection, random packed section, irrigation section, droplet/mist eliminator, gas outlet connection, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, sight level gauge, drain valve and overflow connection, re-circulation pump connection. The interconnecting pipe system will include flow rate control valve and variable area flow meter.

The fume scrubbing unit fabricated in a suitable fabric backed polypropylene, formed and filler rod gas welded, tested to proof, and all externally reinforced with a suitable general-purpose GRP laminate. The interconnecting pipe system will be rigid PVC pressure. Fixings will be stainless steel and gaskets will be neoprene rubber or similar.



P9993 Particulate Matter

Design, fabricate, supply and install an integrated PVC/GRP particulate matter/fume control and treatment system 4,000m³/hr capacity at a gas temperature not exceeding 80°C, 5.5kW centrifugal duty fan and horizontal end suction pump complete with cartridge filter.

The in-house design and built PVC/GRP Venturi Scrubbing Unit complete with Disengagement Tower is Roperhurst model VSU/315/4000/NP. This unit is complete with integral liquor holding tank reservoir, gas inlet taper, cascade disengagement section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch.



ROPERHURST CASE STUDIES

P9873 Potassium Cyanide

Design, fabricate, supply and install an integrated 650m³/hr capacity Potassium Chloride fume treatment system.

PVC/GRP vertical counter-flow scrubber unit Roperhurst in-house design and build model VRP/450/1230/NP. Complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch.



P9139 Cleanroom/Laboratory

Design, fabricate, supply and install an integrated PVC/GRP acid fume and liquid waste control and treatment system, serving new laboratories, installed as part of the Centre for Integrated Semiconductor Materials (CISM) Building.

Roperhurst was the customer's choice to design, fabricate, install, test and commission a 15,600m³/hr capacity acid fume control and treatment system complete with an acid waste neutralisation plant. The system includes Acid Fume Scrubbing Unit, duty and standby 22kw fans, DW154 ductwork, dual contained acid waste pipework, local control panel and discharge stack.

First and foremost the client wanted quality assurance that this safety critical plastic control and treatment system would be fully compliant with BESA standards. This meant that in addition to specifying DW154 as the fabrication and installation standard, they saw the importance of using a specialist plastic ductwork member of BESA like Roperhurst to deliver the project. Only BESA specialist members are audited by BESCA against BESA standards.



ROPERHURST CASE STUDIES

P9192 Bromine

Design, fabricate, supply and install an integrated Bromine vapour control and treatment system of 700m³/hr capacity.

The Bromine vapour scrubbing unit is Roperhurst model reference VRP/500/2650/NP, manufactured at our Barry works in FBPVDF externally reinforced with a general-purpose GRP laminate, finish colour light grey as standard. The unit is complete with integral sump, low level pump cut-off switch, immersion heater, water make-up ball float valve, flanged air inlet connection, random packed section, irrigation bar, demister elimination pad section and flanged air outlet connection.

The unit includes a model PP25 1.5kW 2900rpm TEFV IP55 415/3/50 PVDF case and impeller magnetic drive single external shaft pump interconnected from the scrubbing unit sump and from the pump to the scrubbing unit irrigation bar. All complete with inline pH probe and holder, variable area flow meter with magnetic float complete with BI stable flow switch. The pipework shall also include 2off manual ball valves to enable operator to dump sump contents to waste when indicated by the pH controller.



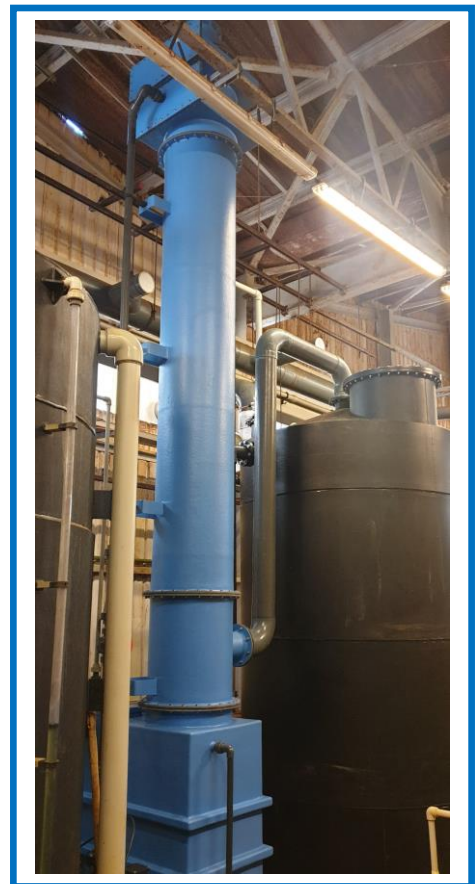
P8608 HCL

The HCL fume scrubbing unit model reference VRP/700/500/PP, fabricated at our Barry works in rigid PVC externally reinforced with a general-purpose GRP laminate, finish colour light grey as standard. The unit is complete with integral sump, flanged inlet connection, random packed section, irrigation bar, demister/droplet elimination pad and flanged outlet connection.

The unit is complete with a Magnetic drive re-circulation pump interconnected from the scrubbing unit sump and from the pump to the scrubbing unit irrigation bar.

The unit has a permanent sealed connection for both the storage tank vent and overflow connections.

The system installed complete with a set of discharge ductwork from the scrubbing unit to atmosphere.



ROPERHURST CASE STUDIES

P8362 Process Plant (Automotive)

Flow Rate	30,564m ³ /hr.
Design PD	450Pa.
Pressure	1.5 times fan
Efficiency	90%
MoC	uPVC/GRP.
Model No.	HRP/6113/1000/NP.
Model Type	Horizontal Random Packed.
Pump Type	Vertical Submersible.
Pump Rate	655ltrs/min.
Pump Motor	5.5kW.

The fume washing unit complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access ports.



P8295 Cleanroom/Laboratory

Design, fabricate, supply and install an integrated PVC/GRP acid fume control and treatment system serving new laboratories installed as part of the Translation Research Hub (TRH) Building.

The £300 Million 6-storey building houses industry leading laboratories, ISO 5/6 rated cleanroom, the state-of-the-art research and office facilities and uses energy efficient building techniques and renewable energy technology.

First and foremost the client wanted quality assurance that this safety critical plastic control and treatment system would be fully compliant with the specification meeting BESA standards. This meant that in addition to specifying the fabrication and installation standard, they saw the importance of using a specialist plastic ductwork member of BESA like Roperhurst to deliver the project. Only BESA specialist members are audited by BESCA against BESA standards.

Roperhurst was chosen to design, fabricate, install, test and commission a duty/standby 23,544m³/hr. capacity acid fume control and treatment system. The system includes duty and standby Acid Fume Scrubbing Unit, duty and standby fans and Local Control Panel.



ROPERHURST CASE STUDIES

P8233 Specialist Coating Plant

Design, fabricate, supply, install, test and commission an integrated PVC/GRP acid fume and liquid waste control and treatment system serving new facility.

The PVC/GRP horizontal flow scrubber unit for the fume treatment is Roperhurst in-house design and built model 6113/800/HFW. This unit offers pH monitoring and is complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The 31,000m³/hr capacity system, including bespoke manual process line with polypropylene lip extraction hoods, DW154 ductwork, fume treatment, inverter-controlled V-belt driven centrifugal plastic fan with duty/standby 18kW motors and discharge stack.



P7033 Steelworks

Design, fabricate, supply and install an integrated PVC/GRP acid fume control and treatment system serving a Chrome Free Passivate and Chemical Treatment Line.

The Roperhurst in-house design and built 19,550m³/hr capacity horizontal fume washing unit is model reference HRP/6112/1000/NP. The unit being pH controlled complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The system is complete with duty/standby 37kW inverter driven fan set.



ROPERHURST CASE STUDIES

P6567 Sulphuric Anodise

Flow Rate	21,100m ³ /hr.
PD	510Pa.
Pressure	1.5 times the fan pressure.
Efficiency	95% during normal operation.
MoC	uPVC/GRP.
Model No.	HRP/6110/NP.
Model Type	Horizontal Random Packed.
Pump	VSL20 vertical submersible.
Duty	226ltrs/min.
Motor	2.2kW 2800rpm 3/50/415 IP55.

The scrubbing unit complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.



ROPERHURST CASE STUDIES

From the Archive:

Multi-Stage Ammonia.

Four scrubbing units are mounted in series on the roof of the plant room. On a failure of the building's air conditioning units and a resulting escape of ammonia gas is captured and extracted at rate of 14,184m³/hr.

To reduce cost and the inherent challenges of delivering, long term storage and dosing with dilute sulphuric acid, the scrubbing unit is designed to operate using water only as the scrubbing liquor.

The gas enters scrubbing stage One, the gas exits stage One to continue to stage Two then on to stage Three. The combined stages reducing the ammonia content by 87.5%.

With the ammonia content reduced by 87.5%, the gas continues to scrubbing stage Four before exiting to the fan unit where the ammonia content of the gas is analysed. If the ammonia levels are below the gases threshold limit the gas is discharge to atmosphere. If the ammonia levels are unsuitable for discharge the gas is returned to the plant room for re-cycling back through the scrubbing units.



Plating Shop.

Process gas streams containing acid and alkali fumes can be suitably treated by a Roperhurst horizontal random packed bed unit giving effective treatment and removal of fumes and particulate matter.

The contaminated gas stream (airflow) enters the unit in a horizontal flow and passing first through a pre-wash and pre-filter section for the removal of any low levels of airborne particulate matter. The pre-treated airflow then passes through a cross-flow random packed media section fully irrigated by a purposely designed spray bar to give the optimum re-circulation capability (liquor rate) and liquor distribution to enhance the rate of impingement and absorption. The choice of random packed media section offers the maximum allowable surface area to airflow volume ratio to give maximum intimate contact between the gas stream and the re-circulating irrigation liquor. The now saturated contaminates are both impinged and absorbed and carried away by the re-circulating irrigation liquor stream.

After passing through the random packed media section the cleaned gas stream continues through a de-mister and/or droplet eliminator that entrains and removes any residual moisture prior to exiting the unit.



ROPERHURST CASE STUDIES

Chlorine Plant.

Design, build, test and commission a chlorine store extraction and chemical scrubbing system for the safeguard of the site in the event of a chlorine gas escape in compliance with Health and Safety Requirements. Liquid chlorine is supplied and fed to evaporators and the resulting chlorine gas conveyed under vacuum to the plant. In the unlikely event of a chlorine gas escape the system provided is required to treat any potential chlorine gas leak in a controlled manner.

Process Parameters:

Gas extraction rate 3,500m³/hr.

Gas Loading

Category A	Minor Leak	0-19ppm gas escape.
Category B	Major Leak	20-227ppm gas escape.
Category C	Catastrophic Failure.	

Design Performance:

Based on the above any outlet discharge will not exceed the Environmental Agency Permit BW1025N for Chlorine.



Anodise (Aerospace)

Fume Extraction & Treatment Design Philosophy.

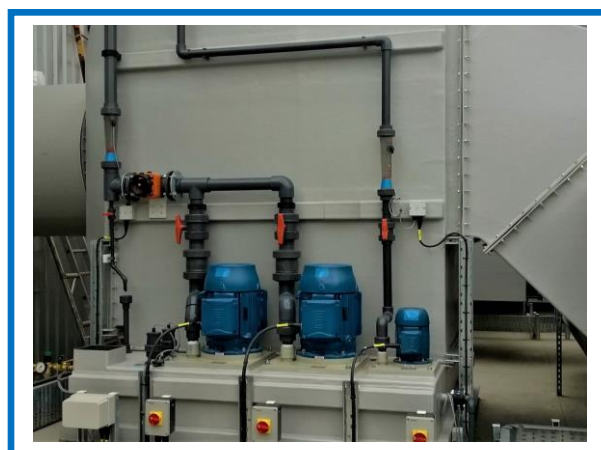
Total treated airflow;

Acid/Alkali Stream	44,000m ³ /hr.
Cyanide Stream	17,000m ³ /hr.

The fume extraction and treatment system comprising fume delivery ductwork systems, wet scrubber units, provided to treat any hazardous fumes, gases, mists or vapours from the various plating shop processes. Treated Air from the plant being discharged to atmosphere through a ventilation stack by duty/standby extraction fans.

The process fume delivery ductwork system is manufactured in rigid PVC stiffened as appropriate in accordance with DW154 and externally reinforced with a generally purpose GRP laminate, offering UV protection, appropriate to a pressure of minus 2000Pa.

The control system is based around a Programmable Logic Controllers, working in conjunction with the Motor Control Centre. A Panel-mounted operator interface (HMI) was provided for onsite monitoring. With Ethernet used to communicate remote telemetry and SCADA. Alarms being raised on the HMI for all failures and abnormal conditions.



ROPERHURST CASE STUDIES

Nitric Acid

Design, fabricate, supply and install a PVC/GRP vertical counter-flow scrubber unit Roperhurst in-house design and build model VRP/550/3000/NP. Complete with integral liquor holding tank reservoir, gas inlet taper, random packed section, irrigation section, droplet/mist eliminator, gas outlet taper, interconnecting pipe system from re-circulation pump unit to irrigation section, plus all necessary access/viewing ports.

The integral liquor holding tank reservoir is complete with water make-up ball float valve, low-level switch, re-circulation pump connection, drain valve and overflow connection. The interconnecting pipe system includes flow rate control valve and flow meter complete with flow limit switch.



ROPERHURST CASE STUDIES

Service and Maintenance.



Roperhurst Limited - Maintain, Repair, Replace.

Our dedicated teams of factory trained experienced fitters offer high levels of service ensuring the design performance and longevity of your assets.

Service Plans to suit your needs.

Full Preventative Maintenance Plans available.

We only provide OEM replacement parts when available.

For details of all our products and services visit us at www.roperhurst.com.

