



Aswathi Industries Limited

Designers, Manufacturers & Turnkey Solution Providers

An ISO 9001:2015 Company



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Waste recycling & incineration



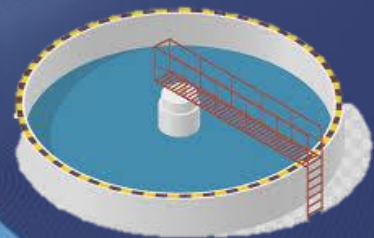
Air Pollution System



Products & Solutions



Industrial Furnace & drying



Water Treatment Plant



Lead Acid Battery

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Recycling System

We at **Aswathi Industries Limited** design, manufacture & supply **Lead-acid battery recycling plants**. It adapts latest design techniques for plant design in terms technology, environment friendly, international standards/practice & quality. Aswathi is committed to deliver its products with consistency in quality & reliability.

The scrap/used batteries are the raw material (automotive/ industrial) for recycling process to reclaim the Lead. Aswathi is committed to provide the sustainable manufacturing process & operations.

We provide complete **Turnkey Solutions** for battery recycling system with the following units:

- Automatic Battery Crushing & Hydro separation unit,
- Acid neutralisation,
- Desulphurization ,
- PP Recycling,
- Smelting unit which uses Rotary Furnace with APC System,
- Refining Section with APC System to produce pure/Lead alloy.
- Ingot Casting Machine for refined/lead alloy as final product.
- Consultancy services for process improvements & refurbishment of plant & machineries.



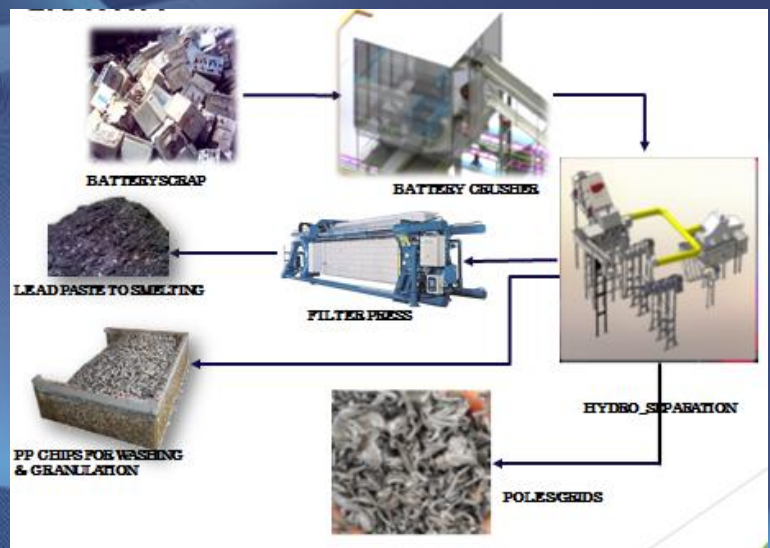
Recycling System

We offer Integrated Solution to set up the Scrap Battery Recycling facility which includes the following:

- Automatic Battery Crusher with Hydro separation unit.
- Acid Neutralisation System.
- Desulphurisation System.
- Crystallisation/salt recovery system.
- Smelting System with APC System.
- Material Handling Equipment.
- Refining unit with APC System.
- Automatic Ingot Casting Machine.
- Auto Stacking Machine.
- Engineering Services for Infrastructure Building.
- Technical Assistance for Process improvement, Plant up gradation.
- Support for Plant Erection & Commissioning.

Automatic Battery Crushing & Hydro-separation.

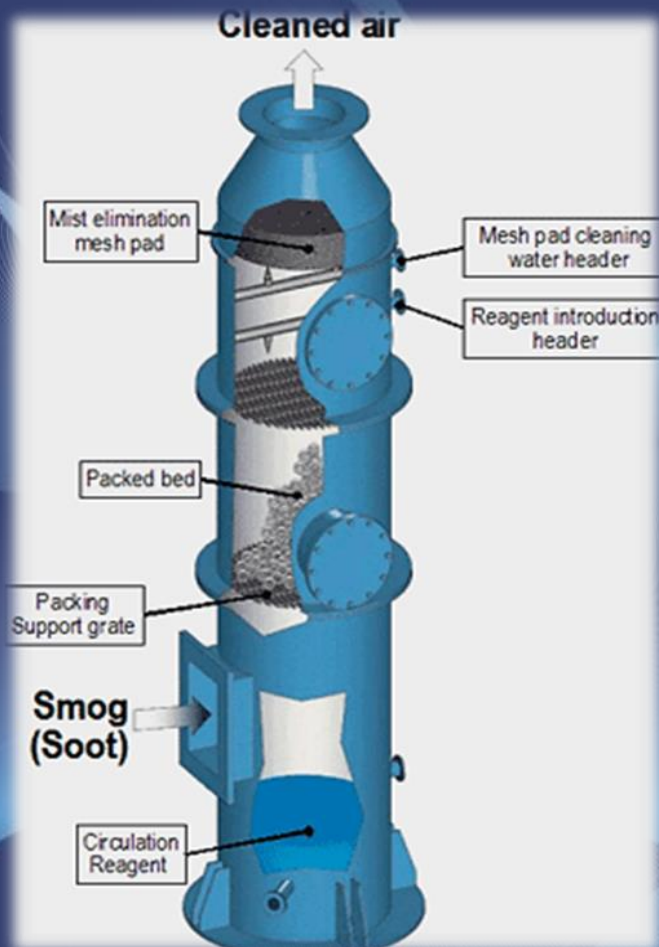
The basic principle of Battery Crushing and Hydroseparation unit is to crush the battery in a closed chamber by impact of rotating Hammers & segregation of metallic lead, Separator and PP/PE by Sink & float mechanism. The products from the Crusher are as Shown in figure.



Acid Neutralisation:

System is provided with Acid neutralisation unit to neutralise the acidic water. As & when recirculation water becomes acidic, is transferred to neutralisation tank where Lime Solution is added and agitated for proper mixing & neutralisation. The neutralised solution then passed through Filter Press to Separate the Calcium Sulphate & Water. The water is recirculate into process & Calcium Sulphate is being stored/disposed off.

Fume Scrubbing:



The acidic fumes/mist generated during battery crushing are collected from Battery Crusher, Reaction Tanks & Vibrating Screens. These are collected through non metallic pipelines with ID Fan and treated at scrubber. At Scrubber, water is being circulated through Nozzles to form droplets / mist to trap the acidic fumes. The cleaned gas is is discharged through vent from Scrubber.



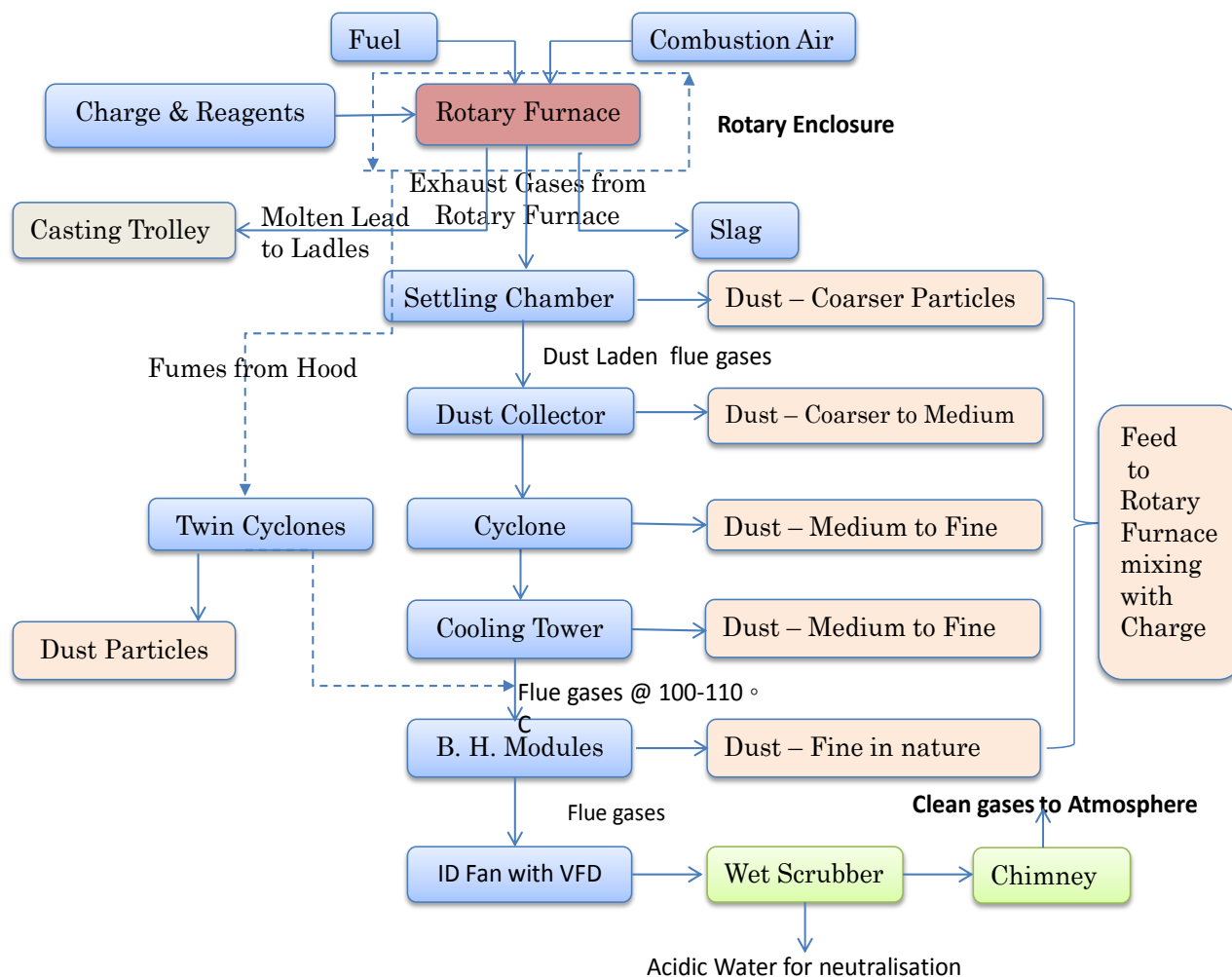
Smelting Process with APC System:

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We provide fixed axis Rotary Furnace to recover the lead from metal bearing materials separated out at Battery crusher. Necessary chemical reactions takes place at Rotary Furnace in presence of reagents at high temperature to remove the Oxygen and Sulphur elements, which is reduction process. Wood charcoal or Petroleum Coke (Coal) is the most commonly used reducing agents in the lead recycling industry. The Flow Chart of the same as shown:

SMELTING PROCESS FLOW CHART





Key feature of **aswathi industries ltd.** *Our Smelting unit with APC.*

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- *Fixed axis type Rotary Furnace .*
- *Combustion System - Burner suitable for solid / liquid / gas.*
- *Charging mechanism as per customer need.*
- *High Efficiency Dust Collection System.*
- *OFF Line Filter Bags for better dust collection*
- *PTFE Laminate over Polyester bags for better filtration.*
- *Knocker at all dust collection points to avoid accumulation.*
- *Closed BHP/Powder collection & storage arrangement.*
- *Packed bed Scrubber for SO₂ scrubbing.*
- *pH measurement & indication.*
- *Auto Caustic Dosing arrangement.*
- *Combined Fugitive Emission System.*
- *Hoods at Charging/tapping point to collect vapors/fumes during Charging /Metal/Slag tapping.*
- *Control Automation - PLC with SCADA with safety interlocks, data collection/storage, trends (Optional).*
- *Zero Liquid discharge system as a result of neutralisation, no toxic liquid generation/discharge.*
- *Follows the Best Available Technique for plant design.*



Refining Process with APC System:

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We design & supply the system required to process the lead bullion to produce pure/alloy by removal of unwanted impurities. Each refining kettle is equipped with an air-fuel burner for melting the lead bullion and keeps the lead bath at the required temperature. The refining of lead is a pyro-metallurgical process and removal of different elements is done by the addition of reagents at proper temperature and severe agitation of lead bath.

Air Pollution Control system - Refining Furnace is provided with hygiene hood to ensure the vapors/fumes generated during the process are collected and treated before let into atmosphere. System is provided with Cyclone followed by Bag House to ensure the complete collection of particulate matters. Similarly Venturi Scrubber is provided on flue gas line to neutralize the acidic fumes before letting them into atmosphere.

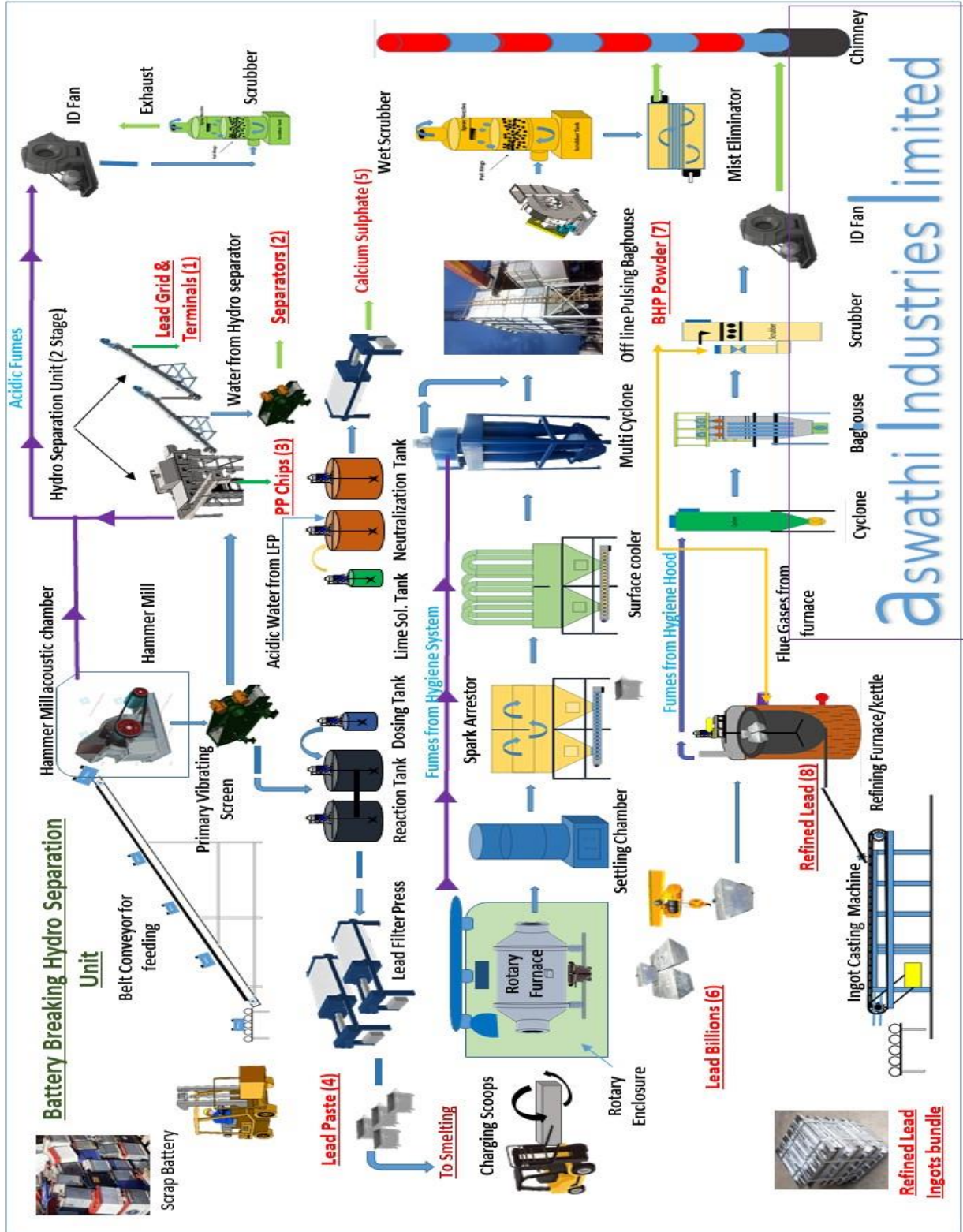
Ingot Casting Machine - refined or alloyed finished lead is casted in the form of ingots of weight around 25 Kgs in cast iron moulds on ingot casting machine which are cooled by water spray and blow of air. The molten refined or alloyed lead is feed to casting machine from kettle by gravity/pump. Distributor is provided for molten lead feed to moulds.

Water Cooling arrangement is provided to allow to solidify the molten Lead. The ingots are hammered to release from moulds & sent for stacking/strapping.



Process Flow Diagram of Battery Recycling Plant

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INCINERATION

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SYSTEM

We design Incineration System suitable to handle the following type of wastes:

- Industrial Hazardous Waste
- Liquid (Organic & Aqueous),
- Solid, Semisolid, Tarry Wastes.
- Gaseous/VOC/Fumes.
- Hospital/Biomedical Wastes.
- Trash/Garbage/Canteen Waste



Types of Incineration Systems can be offered based on nature of wastes:

- Stationary Type Incineration Systems.
- Rotary Kiln type Incineration System:
- Pyrolysis type Incineration System
- Thermal Oxidizer
- Spray Incineration





ROTARY KILNS & DRYERS

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- Dryers for Chemical, Mineral, Ferrous & Non-ferrous components (Fuel Fired & Electrical).
- Tray Dryers, Continuous & Conveyorized Dryers (Fuel Fired & Electrical).
- Rotary Kilns & Rotary Dryers- Direct & In-Direct Fired (Fuel Fired & Electrical).
- For Drying, Calcination, Roasting & Reduction, Continuous as well as Batch type indirect fired with SS 310 & Inconel Shell





AIR POLLUTION CONTROL **EQUIPMENT**

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- **BAG FILTER SYSTEMS**
- **REVERSE AIR BAG HOUSE**
- **ELECTRO STATIC
PRECIPITATORS (ESP)**
- **CONVERSIONS OF ESPs TO
BAG FILTERS/HYBRID FILTERS**
- **RETROFITTING & UPGRADATION**
- **CYCLONES & MULTICLONES**
- **INDUSTRIAL FANS**





TURNKEY SYSTEMS FOR aswathi industries ltd.

AIR POLLUTION CONTROL

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- Dust extraction System for Cement Plants.
- Dust/Fume Extraction Plants for Ferrous & Non Ferrous Industry.
- Fume Scrubbing System for Electronic & Optical fiber Industry.
- Dust/Fume Cleaning System for Chemical, Paper, Pulp and Pharmaceutical & other Industries.
- Dust Collection System for material handling application.
- Dust Collection System for Boiler Application.





INDUSTRIAL FANS

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Types- I.D. Fans, S.A Fans, F.D Fans, Centrifugal Fans, Bag filter Fans, Scrubber Fans, Fume Extraction Fans, Cooling Fans, Exhaust Fans, Combustion Air Fans, Pilot Air Fans, High & Medium Pressure Fans etc.



Industry- Cement Plants, Chemical Plants, Steel Plants, Galvanizing Plants, Power Plants, Furnace Industry, Ceramic Industry etc.





WATER TREATMENT PLANT

- Clarifiers
- Clarrifloculators
- Slurry Hydrate Flow Regulators
- Dual Media Filters
- Filtrate Receiver & Moisture Trap
- HRB Reactors
- Cinemud Filter Sugar Industries.
- Sludge thickeners
- Aerators





Pyrolysis Plant system comprising of:

- Feeding Arrangement.
- Shredder.
- Silo
- Indirectly Heated Rotary Calciner
- Isolation Chamber
- Jacketed Screw Cooler
- Magnetic Separator
- Vertical Screw Conveyor





HEAT TREATMENT FURNACES

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- All types of non-ferrous melting furnaces with continuous casting & other accessories.

- Walking Beam Furnace.
- Roller Hearth Furnace.
- Pusher Type Furnace.



- Silicon Carbide and Super Kanthal Furnaces.
- Aluminum Melting Furnaces.





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WALKING BEAM



**ROTARY DRYER FOR
CASTING SAND**



**DIRECT FIRED
ROTARY CALCINER**



CONTROL PANELS

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ELECTRICAL PANELS





MACHINERIES & TESTING FACILITY

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**PERFORMANCE TESTING OF
FANS**



**CNC PLASMA CUTTING
MACHINE**



**DYNAMIC BALANCING
MACHINE**



AXIAL FAN



SIDE SUCTION DRAFT HOOD & MOTORIZED SWIVEL BEARING ARRANGEMENT





APC EQUIPMENTS

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SCRUBBER



FORCED DRAFT COOLER



WATER COOLED HOOD & DUCT



LADDLE & BAIL ARM WITH J-HOOKS



DOMESTIC CLIENTS

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An ISO 9001:2015 Company

- Alps Environmental Engg. Ltd.
- BARC, Trombay
- Batliboi Environmental Engg. Ltd.
- Bharat Heavy Electricals Ltd.
- Essar Constructions Ltd.
- Envac Environmental Technology Pvt. Ltd.
- F.L. Smidth
- Fives Solios
- GL & V India Pvt. Ltd.
- Hindustan Dorr-Oliver Ltd.
- Lizer Cylinder Ltd.
- NALCO
- Philips Carbon Black Ltd.
- Rubamin Ltd.
- Shriram Engg. Const. Company Ltd.
- Sudharshan Chemical Engg. Pvt. Ltd.
- Sud Chemie India Pvt. Ltd.
- Tata Chemicals Ltd.
- Tata Metalinks Ltd.
- Thermax India Ltd.
- United Phosphorus Ltd.
- Bharuch Enviro Infrastructure LTD





OVERSEAS CLIENTS

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- Agrani Aluminum Pvt. Ltd., Nepal
- AHI Roofing's Ltd., New Zealand
- BA Industries, Fiji
- Cantrex, Port of Spain
- CMRDI, Egypt
- Envac Middle East FZE, Dubai
- Envac Dubai LLC, Dubai
- Envac Saudi Arabia LLC, S.A.
- Eiffel Aluminium Factory, Qatar
- Kenya Fluspar Ltd, Kenya
- Kalu Works, Kenya
- Mombasa Cement, Kenya
- R.K. Metal, Malaysia





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- AHI Roofing's Ltd., New Zealand
- BA Industries, Fiji
- Cantrex, Port of Spain
- CMRDI, Egypt
- Envac Middle East FZE, Dubai
- Envac Dubai LLC, Dubai
- Envac Saudi Arabia LLC, S.A.
- Eiffel Aluminium Factory, Qatar
- Kenya Fluspar Ltd, Kenya
- Kalu Works, Kenya
- Mombasa Cement, Kenya
- R.K. Metal, Malaysia,
- Enviro Hem, Spain.
- Heidelberg Cement Bangladesh Ltd.,
- Wassaif Al Ganoub Steel Factory, KSA, Riyadh ,
- Pushpit Steels Pvt. Ltd., Nigeria.
- Habesha Steel Mill Pvt. Ltd., Ethiopia.
- Top Steel Limited, Nigeria,
- Real Steel Nigeria Limited, Nigeria.
- Techno Asphalt (Pty.) Ltd., Western Cape, South Africa,
- Camso Loadstar (Pvt.) Ltd., Srilanka,
- Ceyquartz MBI (Pvt.) Ltd. , Srilanka.
- Jindal UAE ,
- Pan Gulf Metals & Minerals Trading L.L.C, Dubai.





Domestic Client List **aswathi industries ltd.**

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- Alps Environmental Engg. Ltd.
- BARC, Trombay
- Batliboi Environmental Engg. Ltd.
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- Essar Constructions Ltd.
- Envac Environmental Technology Pvt.
- F.L. Smidth
- Fives Solios
- GL & V India Pvt. Ltd.
- Hindustan Dorr-Oliver Ltd.
- Lizer Cylinder Ltd.
- NALCO
- Torane Ispat Udyog Pvt. Ltd. -Wada, Thane
- Philips Carbon Black Ltd.
- Rubamin Ltd.
- Shriram Engg. Const. Company Ltd.
- Sudharshan Chemical Engg. Pvt. Ltd.
- Sud Chemie India Pvt. Ltd.
- Tata Chemicals Ltd.
- Tata Metalinks Ltd.
- McNally Bharat - NTPC (Through OEM)
- Thermax India Ltd.
- United Phosphorus Ltd.
- FFE Minerals Pvt. Ltd., Vedanta Project (Through OEM)
- GEA Process Engineering India (P) Ltd.





INSPECTION

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THIRD PARTY INSPECTION AGENCIES

- ❖ Avant-Garde Engineers and Consultants (P) Ltd.
- ❖ Bureau Veritas
- ❖ DNV
- ❖ E.I.L
- ❖ M.N Dastur & Company Ltd.
- ❖ Macon Ltd.
- ❖ Profen Engineering
- ❖ Tata Projects
- ❖ UHDE India Ltd.

