

Greenbank India Private Ltd | Company Profile

# Engineering Excellence



## Greenbank India Private Ltd

Part of The Greenbank Group UK Ltd Incorporating:

GAIM Ltd

Greenbank Engineering Services Ltd

Greenbank India Pvt Ltd

Greenbank Terotech Ltd



[www.greenbankgroup.com](http://www.greenbankgroup.com)

## About the Greenbank Group

For more than 60 years Greenbank has been a recognised provider of value-adding products and services to heavy industry, initially specialising in the design, manufacture and application of abrasion and corrosion resistant products. Such products have been core to extending the life of pipework and plant items used in many areas of heavy industry, including power generation, cement, steel, paper, glass, sugar, minerals, automotive, petrochemical and food.

Building on its strong presence and reputation within the power generation industry, in 2000 Greenbank broadened its service and product portfolio through the development, design and manufacture of world-leading technology delivering notable improvements in the combustion performance of coal-fired power plant and, more recently, biomass-fired power plant. Today, Greenbank technology is delivering notable performance improvements in combustion efficiency, emissions management and operational cost reduction.

The company has also become a recognised leader in the provision of engineering and technology based solutions to address combustion performance improvement and optimisation, investing in cutting edge research and development facilities, CFD capability and a highly qualified and experience staff base to ensure ongoing development and delivery of robust, customer focused solutions.

To ensure a well-defined and focused approach to solution delivery, the Greenbank Group is structured accordingly:

- **Greenbank Terotech Heavy Industrial Division (GTL-HI)**  
Heavy industrial fabrication, pipework, abrasion resistant linings for wear protection, pipe supports, valves, dampers, associated design & site services
- **Greenbank Terotech Materials Handling Division (GMH)**  
Bulk materials handling products and services
- **Greenbank Advance Instrumentation and Measurement (GAIM)**  
Centre for innovation, R&D, product design, technical support and test facilities
- **Greenbank Engineering Services (GES)**  
Centre for engineering design, precision engineering, fabrication, fitting and workshop services
- **Greenbank India Private Limited (GIPL)**  
representing Greenbank's interest in India and South Asia

Greenbank is a value-adding engineering and manufacturing company with core values of trust, competence, quality and delivery central to its business mission. Correspondingly the company places considerable focus on innovation, continuous improvement, service and product development and delivery through a workforce commensurately qualified and experienced and which operates to a standard of excellence expected by the company and the industry it serves.

To illustrate the focus on staff investment, GAIM - Greenbank's R&D business - employs engineers qualified to postgraduate and PhD standard. Close to academia and an emphasis on collaborative projects provides further routes to develop core competence of staff. GAIM is also core to facilitating and delivering innovation within the Group, as well as aiding market readiness and implementation.

Over a number of years, the company has received recognition, reward and endorsement on many occasions from an array of local, regional and national organisations, receiving honours for innovation, people development, export and business achievement, such as the Queen's Award for Technology & Innovation, as well as winning local entrepreneur, business and regional employer of the year awards.

Greenbank continues to innovate, to invest, to deliver and constantly offers that rare mix of in-house capability combining engineering thought leadership with leading technological capability, resulting in the company becoming one of the world's foremost providers of solution driven services and products to the bulk handling and power generation industries.

**Greenbank  
Group**

**Greenbank Terotech  
Heavy Industrial  
Division**

**Greenbank Terotech  
Systems Division**

**Greenbank Terotech  
Materials Handling  
Division**

**GAIM  
R&D Division**

**Greenbank  
Engineering  
Services Ltd**

**Greenbank India  
Private Limited**

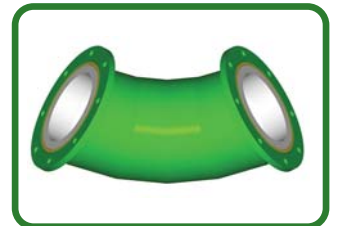
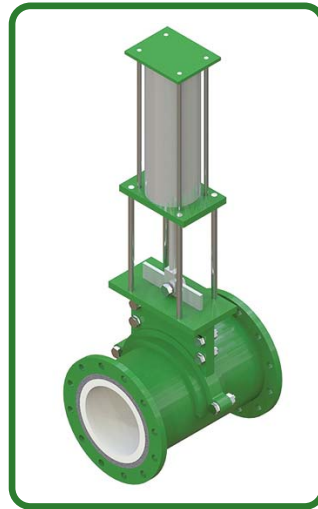




# Heavy Industrial Division Products & Services

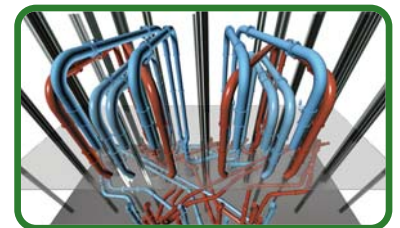
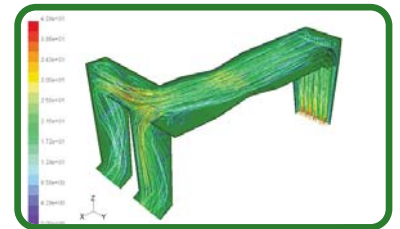
## Wear Protection - PF, Ash and Dust Valves and Dampers

- **Wear Protection Systems**  
Abrasion & Corrosion-Resistant Lining Systems  
Advanced Vacuum Bonding Lining System
- **PF & Ash Pipework**  
Lined & Unlined Pipework, Elbows & Fittings
- **PF & Ash Valves & Dampers**  
Lined & Unlined Isolation & Non-Return Valves
- **Cyclones, Chutes, Hoppers & Fabrication**  
Fabrication, Lining and Installation Services
- **Relining & Refurbishment**  
Site and Shop-Based Wear Protection Relines



## Piping & Ducting Systems - Design, Refine, Better or Improve

- **Site Survey**  
Detailed Site Survey & Measurement , 3D Scanning
- **Engineering Design**  
Detailed Design, Pipe Routing, 3D Modelling, FEA, Structural Assessment, Pipe, Ducting & Supporting Systems, General Arrangement & Installation Drawings
- **CFD and DEM Capability**  
Design and refinement of all two-phase flows
- **Scheme Proposal**  
Feasibility, Assessment & Engineering Studies
- **Pipework & Supporting Systems**  
Design, Manufacture & Installation



## Systems Division Products & Services

### Pulverised Fuel Balancing & Control

Improvement of fuel distribution across the burner zone (and across the boiler load range) is key to delivering improved combustion performance and associated coal-fired boiler performance optimisation.

This is achieved through measurement and understanding of fuel flow and associated velocity specific to each burner PF pipe configuration followed by the necessary adjustment to fuel flow using appropriate flow-balancing technology. This helps facilitate improved alignment of air flow and fuel flow, thereby helping to establish the required air-to-fuel ratio (AFR).

Addressing improved fuel distribution and associated burner-to-burner AFR is fundamental to managing emissions to air such as NO<sub>x</sub>, CO, particulates, etc. It is also fundamental to addressing other combustion performance-related challenges associated with fireside corrosion and carbon-in-ash as well as slagging and fouling within the furnace. Delivery of improved combustion stability is also fundamental to improved flexible operations and minimum stable generation (MSG).

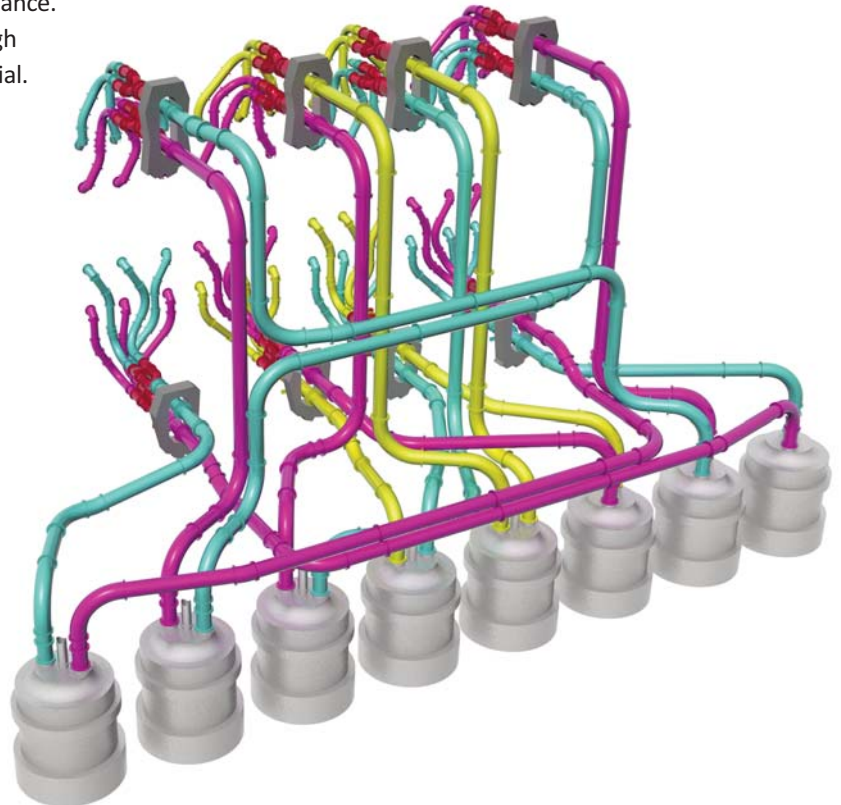
In addition to fuel distribution, PF particle size distribution can have a significant impact on burner combustion performance. Good management of PF particle size distribution through appropriate management of the milling system is essential.

Therefore, on-line measurement and monitoring of mill exit PF particle size distribution will help facilitate appropriate mill management and help ensure fuel is delivered to the burner zone at the required particle size distribution.

Whilst addressing and managing key influencing factors such as burner-to-burner fuel distribution, fuel quality and particle size distribution are essential to delivering improved combustion performance with commensurate improvement in boiler performance, there are other factors that must be addressed. Management of combustion zone stoichiometry (theoretical plus excess air necessary for complete combustion) is a further key element that must be addressed.

Combustion zone stoichiometry is managed via the addition of appropriate primary and secondary air flow to the furnace. Getting the balance right is extremely important but is often undermined via excessive 'uncontrolled' furnace air ingress (tramp air) or in-leakage at other locations such as the air-heater and duct seals.

Key to facilitating improved combustion performance is the balancing of fuel distribution across the burner zone, management of fuel quality and PF particle size distribution and minimising uncontrolled air ingress to ensure the combustion zone operates at the required AFR.



# Combustion Enhancement Products & Services

Greenbank's award winning products and services help deliver improvements to large combustion plant, improving not only efficiency and greenhouse emissions but health and safety in the workplace.

## **GravMaster® Pressurised Gravimetric Feeder.**

Designed to accurately discharge unpulverised fuel into a pulverising mill. Improves particle fineness and milling throughput, reduces bunker blockages and fires, and improves efficiency by keeping hot air away from the feeder and bunker.



## **CoalFlo® PF Balancing Damper.**

Designed to balance PF distribution from multi-outlet mills. Improving PF distribution provides both plant flexibility in operation and the ability to run more efficiently on high and low load.



## **PFMS® PF Monitoring System.**

Designed to provide rapid on-line measurement of pulverised fuel distribution in burner pipelines. Accurate and rapid on-line measurement gives the operator the ability to optimise PF distribution and stoichiometric conditions under different loads.



## **VARB® PF Diffuser.**

Designed to break PF roping inherent in the conveying of fine particulates in air. VARB technology can guarantee good distribution of particulates at splits in pipelines which is necessary for both plant efficiency and reduction of greenhouse gases such as NOx and CO.



## **G-CAM® Carbon-in-Ash Analyser.**

Designed to rapidly analyse the level of unburned carbon-in-ash carried in flue gas. Assessing levels of carbon-in-ash provides the operator comfort over boiler stoichiometric conditions which helps ensure fly-ash is suitable for re-sale rather than landfill.



## **MillMaster® Particle Size Analyser.**

Designed to accurately measure particulates taken from a PF or dust ducting. Measuring the size of PF particulates monitors the performance of the pulverising mills or exhaust gases and advises the operator of any deterioration of plant performance.



## **GA200® Series Acoustic Steam Leak Detection.**

Designed to provide advanced warning of high-pressure tube-leaks on large combustion boilers. The system accurately identifies and locates a boiler tube-leak at early stages against the noise of an operational boiler.





# Materials Handling Products & Services

Greenbank Materials Handling products and services offers both standard and bespoke product and systems based designs and solutions for companies operating in the power, cement, steel, minerals, glass, pharmaceuticals and ports and terminals markets. GMH is also at the forefront of developing bulk materials handling solutions for the new and emerging biomass market.

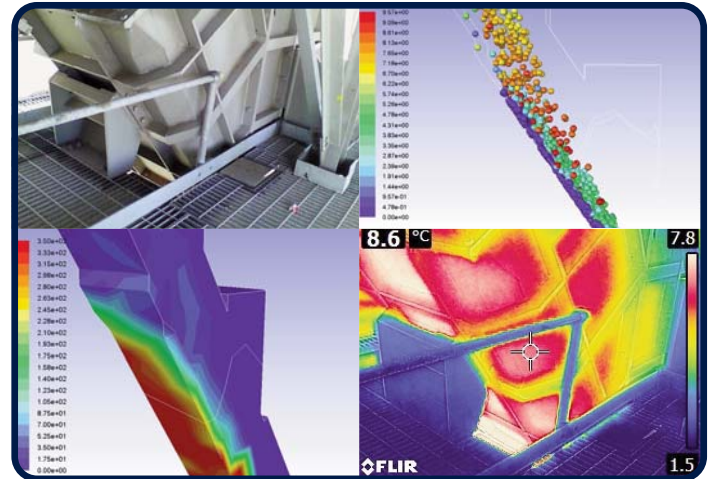
## Controlled Flow Chutes

Inefficient designs can result in the degradation of material, increased spillage, generation of dust, increased wear on conveyor components and increased power consumption.

Another knock-on effect of poor design can be increased costs stemming from spillage, demurrage, maintenance and additional repairs.

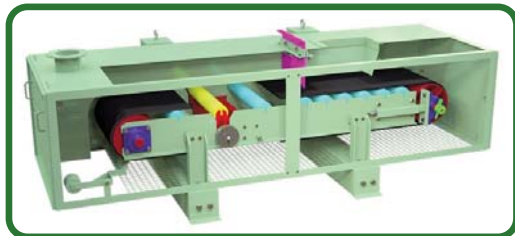
Greenbank provide chute designs that increase the life expectancy of conveyor components, reduce downtime and minimise maintenance costs.

From conception to installation, our specialised engineers combine the latest techniques in CFD and DEM with expert design skills to produce high performance chutes which reduce downtime and improve operational efficiency.



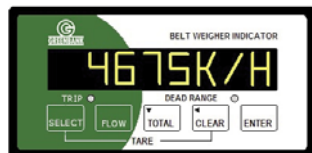
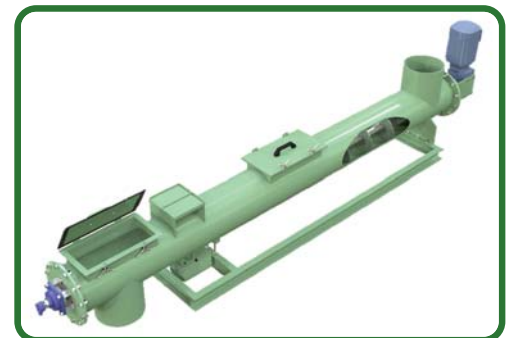
## Continuous Weighing Products

Greenbank now offers a full range of industrial weighing equipment, including belt-weighers, feeders, weigh screws and silo weighing. Using the GBWI-436 dynamic belt-weigher controller enables continuous calculation of the rate of material flow over the belt and the total quantity of material transferred.



**GB450 & GB950 Series Belt Feeders**  
Gravimetric Belt-Feed Systems

**GWS Series Weigh Screws**  
200, 250 & 300mm  
Gravimetric Screw Feeders



**GBWI-436 Controller**  
Dynamic Belt-Weigh Controller



**GB100® GB200® GB300® & GB400® Belt-Weighers**  
Robust Cost-Effective Weigh-Feeders

# GAIM

## Greenbank Advanced Instrumentation & Measurement

Working independently with leading research universities and design centres, GAIM is dedicated to further enhancing Greenbank's product portfolio and developing innovative new technologies which will help improve the efficiency and reduce the environmental impact of power generation and related industries.

The company specialises in the development of cutting-edge scientific equipment that is designed to characterise, measure and control two-phase fluid flows in the power generation, pulverised fuel (PF), cement and steel and many other industrial, using state-of-the-art technology.

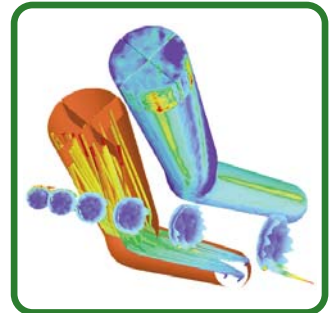
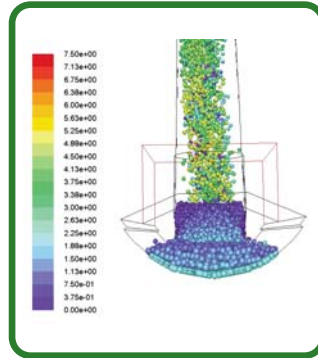
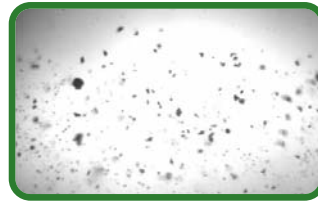
### Computational Fluid Dynamics and Discrete Element Modelling

- **CFD & DEM**

Multi-Phase Flow, Aerodynamics,  
Hydrodynamics, Heat Transfer,  
Fluid Combustion System Analysis

- **Advanced Instrumentation & Measurement**

Particle Image Velocimetry  
Particle Size Analysis  
Microwave Vector Network Analysis  
Bespoke Software Systems



### Research & Development

Modelling (DEM) and Computational Fluid Dynamics (CFD). Greenbank also has access to numerous other experimental facilities and expert knowledge, having established links with top universities such as Nottingham, Leicester, Loughborough and Cambridge.

Greenbank boasts a 1/3 scale PF facility including separating cyclones which lead to weighing systems, bifurcating and trifurcating flow lines and de-dusting filters.

- **R&D**

Product Development  
Funded and Self-Financed Projects  
Particle Image Velocimetry  
Microwave Vector Network Analysis

- **Experimental Test Facilities**

1/3 Scale Conveying Test-Rig Testing  
Flow Analysis, Optimisation,  
Demonstration and Proving





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## **The Greenbank Group UK Ltd**

Incorporating:

**Greenbank Engineering Services Ltd**

**Greenbank India Pvt Ltd**

**Greenbank Terotech Ltd**

**GAIM Ltd**

Wear Protection and Lining Systems  
Pipework Ductwork and Supporting Systems  
Biomass Conveying Systems  
Heavy Industrial Fabrication and Machining Facilities  
Combustion Optimisation Products and Systems  
CFD & DEM computer modelling  
Continuous and Gravimetric Weighing Products & Systems  
R&D and Test Facilities

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