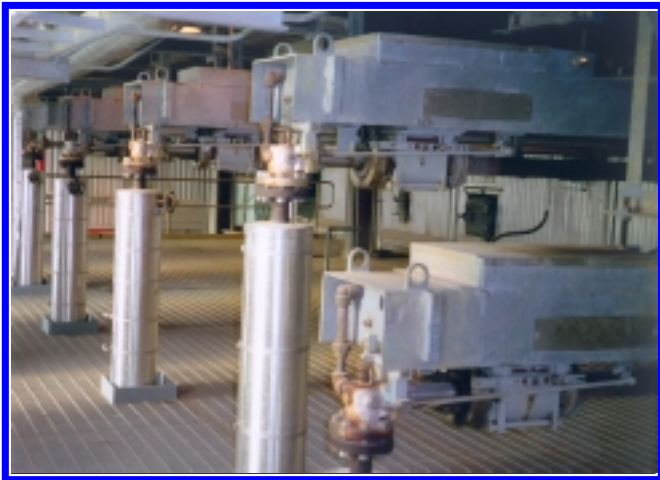
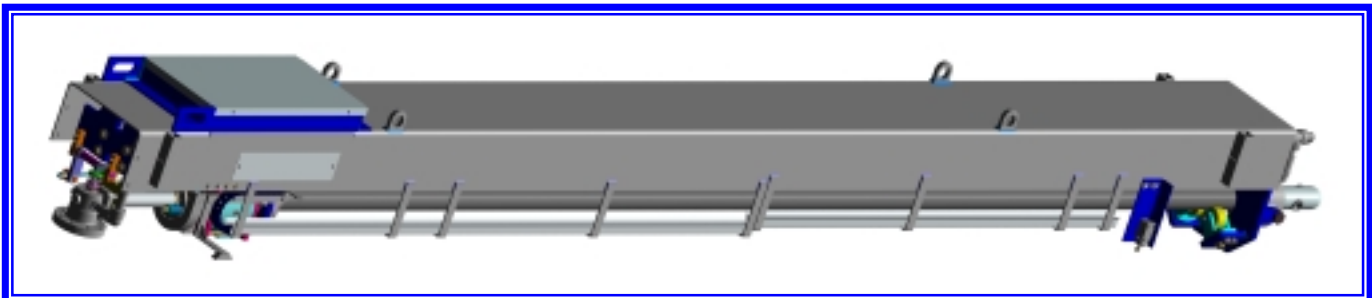




MODEL RS & RSI

RECOVERY SERVICE SOOTBLOWERS



DESIGNED FOR RECOVERY BOILER ENVIRONMENT

The model RS is designed to specifically solve recovery pluggage problems using the latest technology and most cost effective processes. This design provides more effective cleaning in shorter cycles to remove salt cake before it has time to build up and cause permanent pluggage. The RS has more cleaning reserve available if extended runtime or higher throughput is needed. Significant steam savings are achieved over conventional sootblowers. High equipment reliability is achieved through better system design and component selection.

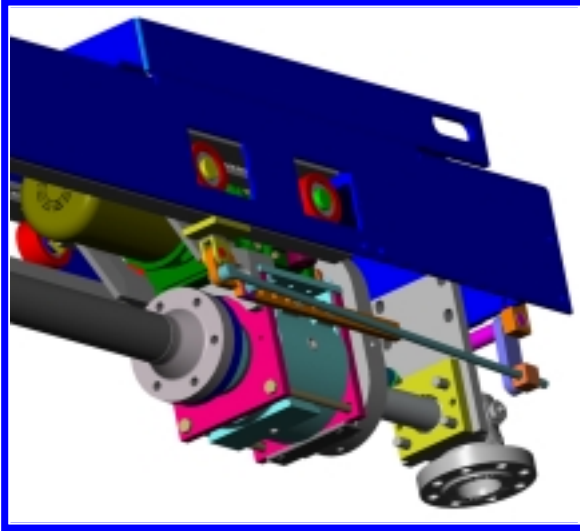
HISTORY

In 1988 Clyde Bergemann performed a thorough analysis of the Pulp & Paper sootblower requirements associated with the severe fireside deposits found in chemical recovery boilers. We went directly to the Pulp & Paper community with our inquiries to determine first hand what the needs were and how best to address these needs. By combining this research with our over 60 years of experience Clyde Bergemann developed the model RS Recovery Service sootblower.

Within a very short timeframe the model RS has become the sootblower of choice in the paper industry around the world. The paper industry has installed thousands of model RS sootblowers in hundreds of boilers throughout the world. Today the RS sootblower continues to replace existing installed sootblowers at an astonishing pace.

DRIVE RELIABILITY

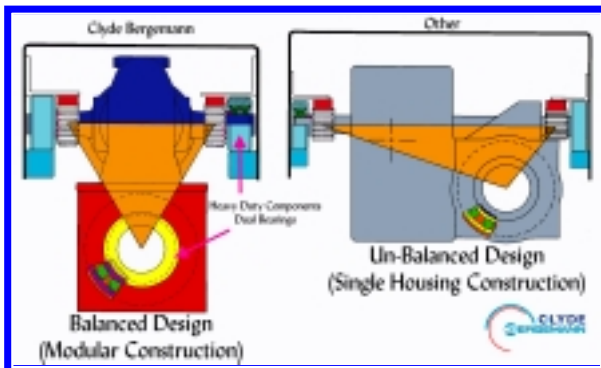
The RS uses Clyde Bergemann's well proven dual rack-and-pinion drive system with heavy-duty chain rotation. This is the safest sootblower drive system on the market - superior to chain, cable, and single rack-and-pinion drives. When compared to competitive dual rack-and-pinion sootblowers, the RS "balanced" drive loads each pinion equally. The competition uses a "left" and "right" handed housing which loads the pinions in an unbalanced, unequal way, resulting in high pinion/rack wear. The RS drive provides the user a higher load carrying reserve for difficult cleaning areas and/or longer boiler run times. Competitive "handed" sootblowers also require the user to carry a duplication of spare parts for each "handed" blower.



LUBRICATION

The RS has separate gearbox and lance hub housings. This design keeps the steam heat from the mechanical gearing allowing for cooler lubrication conditions thus extending the life of the lubricant and avoiding gearbox seal leakage. Due to the minimal lubrication losses on the RS, housekeeping around the boiler is much cleaner. The hub bearings are lubricated with a synthetic high temp. grease that will not cook out or harden even under extreme temperatures. The lubrication life on the RS is typically five times the lubrication life on competitive sootblowers.

BALANCED DRIVE

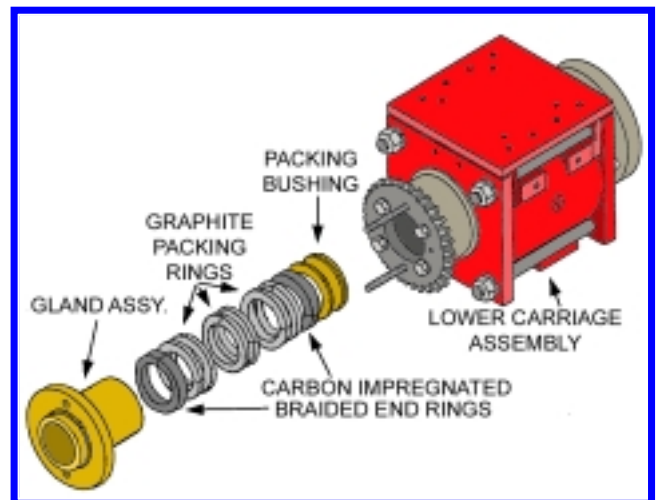


The dual rack-and-pinion drive has been developed using a "Balanced Design" concept. All major components such as the poppet valve, feed tube, traveling carriage and lance

tube are symmetrically located on the centerline of the sootblower housing. This design also utilizes a modular component design improving maintainability, durability and service.

PACKING LIFE

Short packing life is typically the #1 sootblower maintenance headache. The RS has a much longer packing life because of the more stable four-roller drive/carriage platform and our superior packing technology. On two roller, and/or rocking drive systems, the packing is alternately crushed and released which results in rapid packing breakdown. The RS uses as standard a graphite packing system with an automatic tightener (live loading). The feed tube is also available with insulation and special plating to further reduce maintenance requirements.



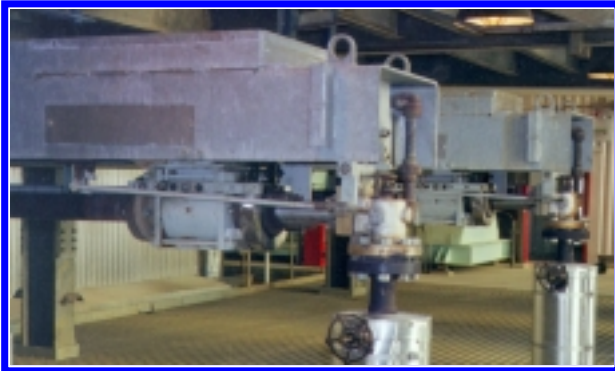
LANCE SAFETY

The lance tube is attached with a solid, butt-welded one-piece flange to the carriage to provide maximum integrity. The nozzle head is a heavy wall investment casting made from heat resistant 310SS providing extended nozzle life. The venturis and the nozzle extensions are made from 304SS.



In the unlikely event of a lance failure, retrieval is much easier with the model RS since the external rotation chain can be disconnected from the gearbox. This allows the dual rack-and-pinion drive to pull the bent lance out of the boiler without rotating it. This feature minimizes the sootblower downtime resulting from a bent lance tube.

ACCESSABILITY



To improve the maintainability, the RS provides easy access to all essential components. For example, the large top opening allows removal of the gearbox within 30 minutes, compared to several hours with competitive sootblowers. Other components such as valve operating mechanisms, and proximity switches are externally located to the housing for better access.

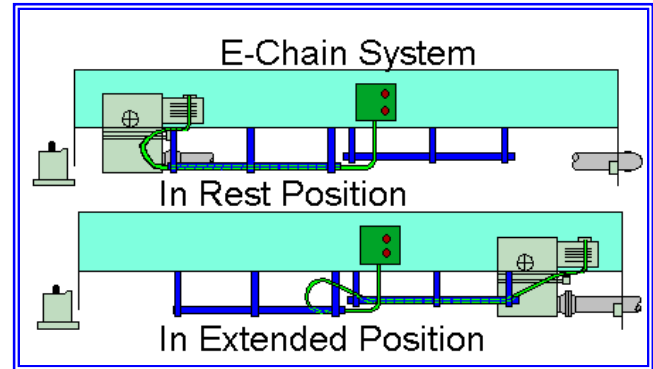
BLOWER STABILITY

The heavy 5/16 inch thick housing is the most rugged on the market and provides the RS with an extremely stable base. Heavier loads, higher speeds, and higher duty cycles can be carried on a much heavier frame. We have pioneered hot dip galvanizing as an alternative to painting to minimize the corrosion in the aggressive environment found in recovery boilers.

ELECTRICAL

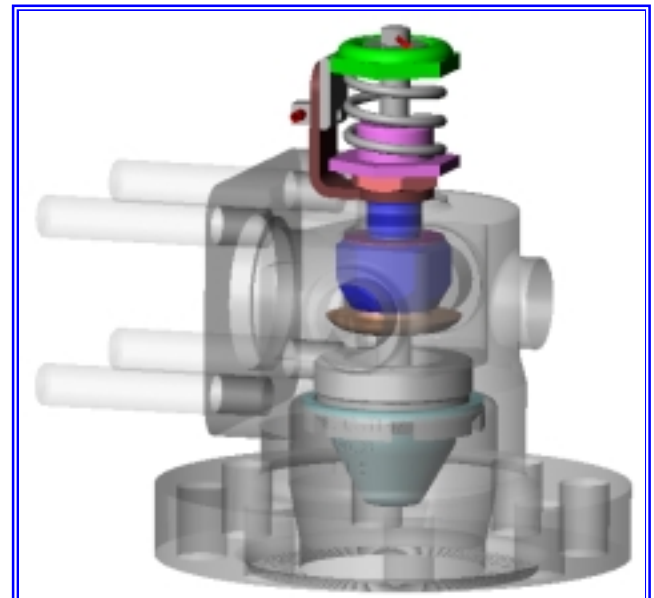
The power to the motor is supplied via a rugged "E-chain" track eliminating dragging coiled cords which can snag or fray with use. Cable life with the "E-chain technology" is 3 to 5 times longer than coil cords and eliminates the potential single phase motor failure that

have occurred with coiled cords. Proximity switches are standard. Cable connections are made with rugged quick disconnects. Our mechanical drive protection avoids catastrophic failures typical with limit switches.



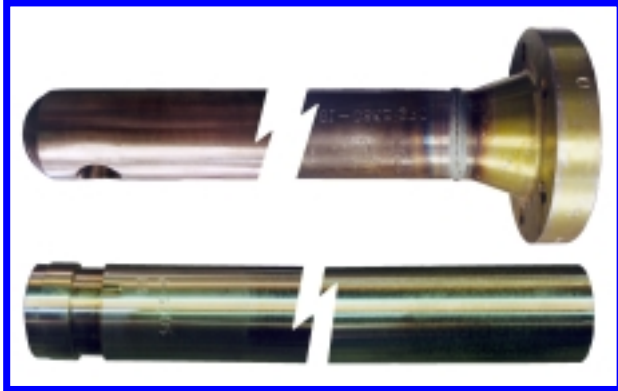
POPPET VALVE

The poppet valve is a mechanical design using a removable seat and disc assembly for ease of repair. A pressure control orifice is provided so the blowing pressure is adjusted independent from the valve opening. The pressure adjustment is made external to the poppet valve and while the sootblower is in operation. This allows for very precise adjustments, improved safety and quick adjustment. No other sootblower manufacturer offers this. Sootblower pressure optimization without this feature cannot easily be achieved and typically more sootblowing steam is consumed than necessary.



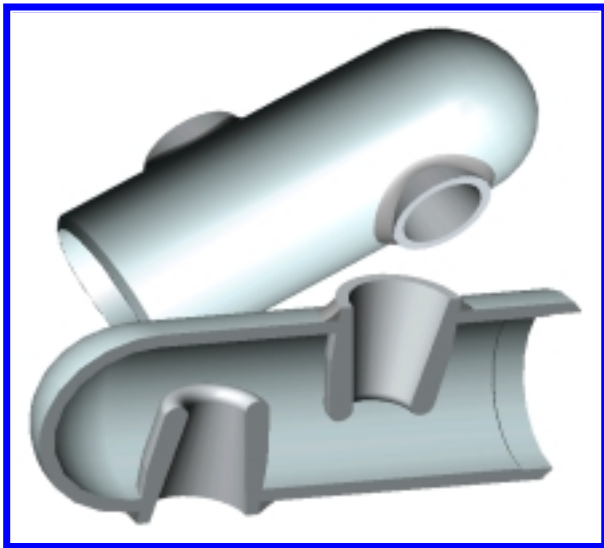
LANCE AND FEED TUBE DESIGN

The feed tube is constructed using surface ground 304 SS material. This component uses an engineered end plug to connect to the poppet valve; thus, eliminating feed tube thread damage problems and improving maintainability.



The lance tube is 3.5" chrome moly tubing with SS head assembly. The flange is a forged & machined one-piece design made integral with the lance for durability and safety. Nozzles can be high impact or flush ground. The lance is indexed during travel to allow for an infinite number of cleaning helix paths improving cleaning coverage and reducing erosion.

CFE NOZZLES



The RS sootblower is available with the Contoured Full Expansion (CFE) nozzle. This revolutionary technology (patent Number

5,505,163) provides up to twice the cleaning power with the same steam flow as conventional high performance nozzles or allows as much as 30% steam savings while maintaining comparable cleaning. In the development of the CFE nozzle, Clyde Bergemann's design engineers were careful to improve the cleaning power without increasing the users operational risk.

MULTIPLE INDEXING

Clyde Bergemann's proprietary indexing offsets both venturis to a different angle each time the sootblower is operated. This ensures that a different helix is followed which results in a more complete cleaning of the tube surfaces. Competitors typically clean on the same path in and out or have at best two different helixes only. The Clyde Bergemann indexing is accomplished by a clutch in the gearbox and can truly offer infinite indexing capabilities.

HIGH SPEED AND PRESSURE

The balanced dual rack-and-pinion, four-roller carriage drive provides greater load carrying capability for the model RS sootblower. Higher speeds, pressure and cleaning frequencies can be used if needed without sacrificing reliability.



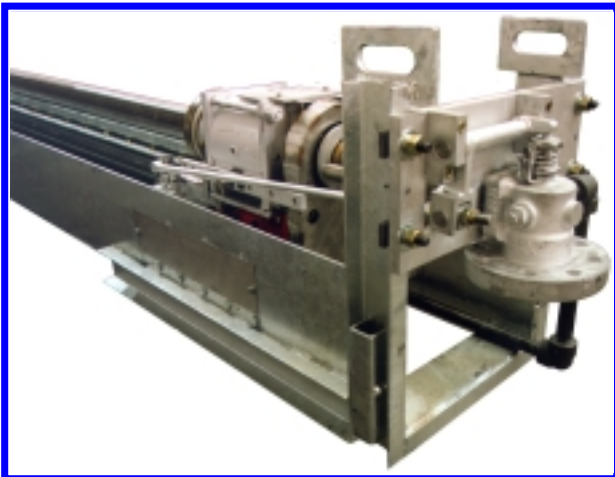
MODEL RSI INVERTED RECOVERY SERVICE SOOTBLOWER



GENERAL

The model RSI Inverted Recovery Sootblower is a complete redesign of the original RS sootblower. This redesign was made to allow for sootblower installations with overhead clearance limitations of down to 6 inches for proper operation. The canopy structure was changed to add debris-clearing openings in the bottom panel and to reposition back hangers and strengthen maintenance access supports. The roller rails and gear-rack angle iron is positioned to accommodate the different stresses set up by the inverted structure. The e-chain electrical system and front lance support rollers are also repositioned to allow for operational changes in the design. The RSI is a complete design concept, not simply an inverted RS sootblower.

DIFFERENT YET THE SAME



Even though the RSI is a different sootblower from the RS, all of the components associated with it are the same. The poppet valve,

carriage assembly, lance, feed tube, front rollers, wallbox and electrical components are the same. The RSI has all the features and associated benefits as detailed in this brochure. The major difference between the RS and RSI is in the design in the canopy structure to overcome installation location difficulties.

INSTALLATION FLEXIBILITY

The RSI lends itself well to many types of installation challenges. For locations beneath upper floors or in locations with structural steel or immovable steam or process piping, the RSI can provide the clearances required. Also, in locations close to the floor or in tight spots that would make future maintenance and upkeep difficult the RSI can be used to provide more accessibility to the components. In short, the RSI provides options to improve overall sootblower operation, functionality and maintainability.





Standard Specification

Drive & Electrical

| | |
|-----------------|---|
| Motor | 2.0 HP, NEMA 145TC, TEFC, Class B Insulation, 480V/3Ph/60Hz |
| Travel | 35 Feet (10,000 mm) Plus |
| Traveling Speed | 110 in/min (2800mm/min) |
| Helix | 5 inch (125 mm) |
| Limit Switches | Proximity, External Wiring |
| Terminal Box | NEMA 4 Epoxy Paint, Push Buttons |
| Wiring | External non-metallic flexible conduit, E-chain power feed to motor |

Poppet Valve & Flow Components

| | |
|------------------|---|
| Rating | ANSI 600 WC6 Cast Steel |
| Companion Flange | ANSI 600, 3 in., weldneck, A106, reducer to 2 in., (50mm) or 2.5 in. (65mm) |
| Pressure Control | External On-line |
| Feed Tube | 2 3/4 in. (70) o.d. A269 304 SS, 26-32 Rc, ground finish |
| Packing | Pure Graphite with Braided End Rings, Live Loaded |
| Lance Tube | 3.5 in. (88.9mm) o.d., A213, T11 with 310 SS nozzle and HI-PIP Venturis |
| Housing | 5/16 in. (8 mm) thick canopy, Hot Dip Galvanized |
| Wallbox | Positive Pressure with Internal Steam Purge and Air Connection |

Options

| | |
|------------------|--|
| Drive/Electrical | Non standard V/Hz variable speed, additional electrical components |
| Poppet Valve | ANSI 900 WC6 cast steel, automatic variable pressure |
| Lance Tube | 4 in. (102 mm), CFE Venturis |
| Feed Tube | Special Platings, Insulation |
| Housing | Stainless Steel or Epoxy Paint with Organic Zinc Primer |