



SAMSON™

BULK MATERIAL RECEIVING UNIT

B&W

AUMUND GROUP

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Mobile Samson™ Feeder receives Kaolin for Ship Loading (Truck to Ship Concept)

A UNIQUE CONCEPT

B&W Mechanical Handling Ltd. developed the Samson™ surface feeder concept to satisfy the demands of clients requiring a mobile solution to receive general bulk materials such as coal and aggregates direct from tipping trucks in mainly Ship Loading applications where fixed plant was not a viable option.

The Samson™ concept eliminated the need for any truck ramps or fixed civil work and was rapidly extended to fixed plant projects where the flexibility of surface installation was a clear benefit.



Mobile Samson™ in Quarry with Integral Sizer receives from Dump Trucks



The Samson™ Receives Coal for the Coking Plant at a major UK steel works operating continuously 24/7

SURFACE INSTALLATION

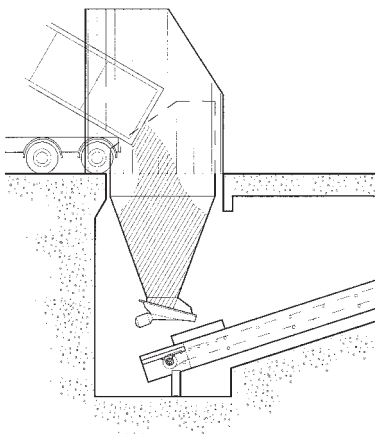


The Samson™ receives Sand for a Mortar Plant discharging to Belt Transfer Conveyor

The Samson™ provides a compact solution for this new Mortar plant and by combining a cross mounted transfer conveyor with a vertical bucket elevator to raise the sand to storage silos the complete equipment could then be surface mounted avoiding the cost and complication of underground pits and hoppers.

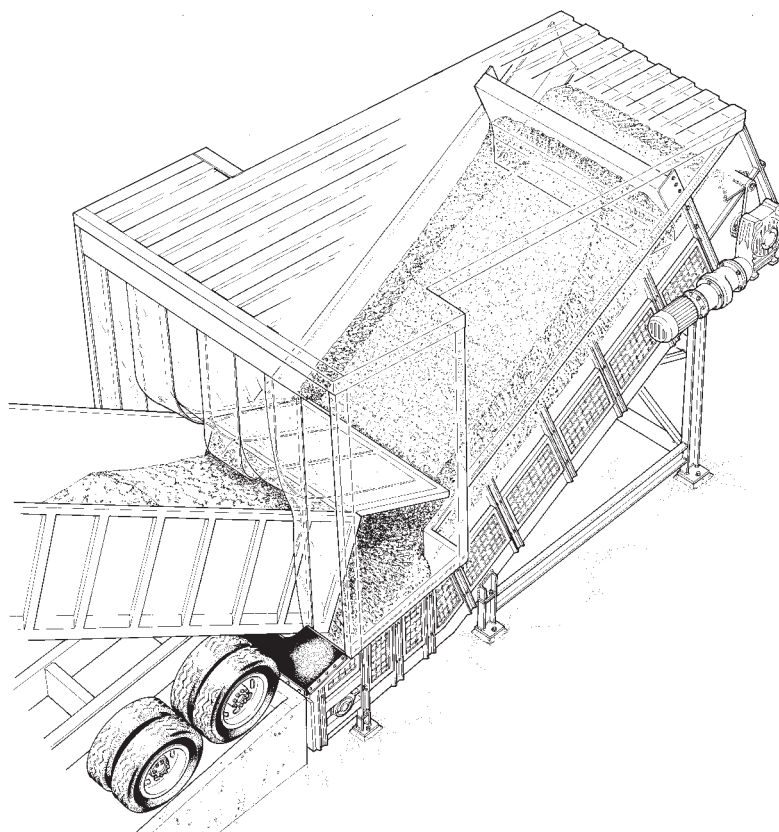


- No Deep Pits.
- No Underground Hoppers.
- No Expensive Civil Works.
- Flexibility of Location.
- One Piece Integrated Machine.
- Receives Direct from Trucks.
- Receives Direct from Shovels.
- Buffer Holding Capacity.
- Fast Truck Discharge.
- Controlled Rate Feeding.
- Handles Dry and Dusty Materials.
- Reduced Dust Generation.
- Handles Wet and Sticky Materials.
- No Risk of Bridging or Blockage.
- Reduced Energy Consumption.
- Easy Maintenance Access.
- Easy Housekeeping Access.
- Reliable in Service.
- Proven References Worldwide.



Illustrated above a conventional underground truck tipping hopper with deep pit and feeder discharging to an inclined belt conveyor to raise the material out of the pit and to the associated process plant.

Requires permanent and expensive civil works and cannot be relocated to accommodate plant development.



The Samson™ Bulk Material Receiving Unit Truck Dump Station

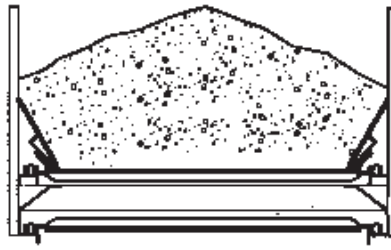
AN ECONOMICAL SOLUTION



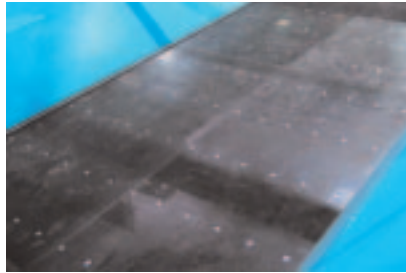
In this Cement Grinding Plant three Samson™ Bulk Material Receiving Units intake Cement Clinker plus other additives for the whole plant



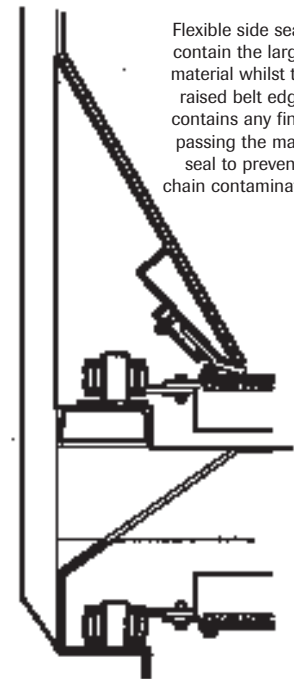
The wide Apron-Belt design permits a very low loading height allowing the trucks to discharge direct to the entry section with only a small access ramp.



Wide Belt Design Eliminates Bridging



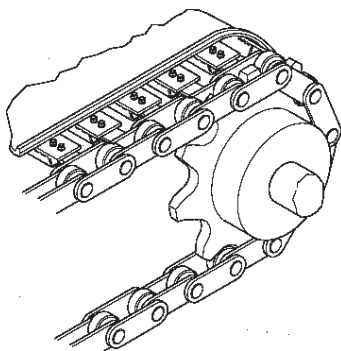
The wide Apron-Belt design combines the strength of a Steel Apron Feeder with the cleanliness of a Belt Feeder. Since the material depth is less than the belt width the bridging and blockages associated with conventional tapered hoppers is completely eliminated guaranteeing reliable discharge.



Flexible side seals contain the larger material whilst the raised belt edge contains any fines passing the main seal to prevent chain contamination

Highly developed over many years the Samson™ side seal contains the material within the body preventing spillage.

CONSTRUCTION CONCEPT



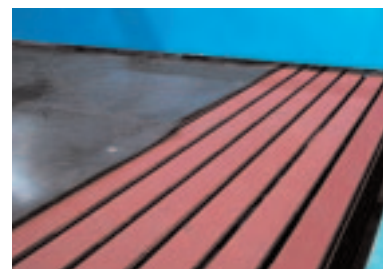
Trapezoidal shaped apron bars at every chain pitch provide maximum support and allow minimum sprocket diameter.



Flexible Side Seal with outer Belt Ledge



External Chains Outside the Material Flow



Steel Apron Bars Support the Load



Conveyor Belt Aligned with the Chain Pin Centre and Rivetted to the Steel Apron Bars



Load Carried on the Chain Rollers



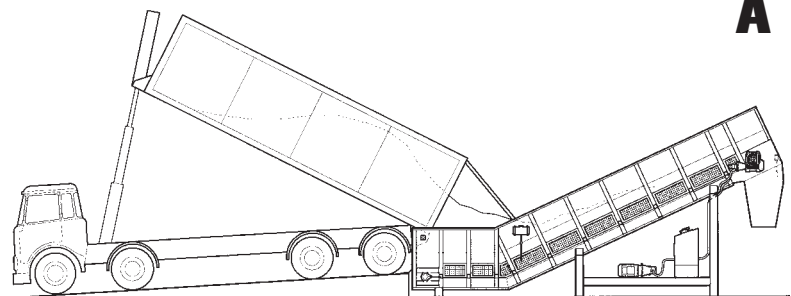
Broken Glass is received by the Samson™ at a Recycling Operation

OPERATIONAL CONCEPT

Material is drawn from the tipping truck into the Samson™ body by the forward moving apron-belt conveyor. The operating concept can be divided into three stages as illustrated.

Stage A:

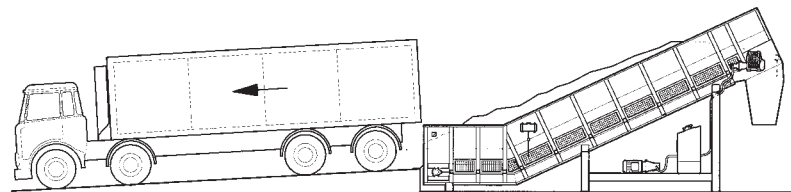
The first truck arrives and discharges its material on to the forward moving Samson™ apron-belt. As the Samson™ belt moves forward so the material is drawn from the truck body.



Material is drawn into the empty Samson™ body by the forward moving Apron-Belt

Stage B:

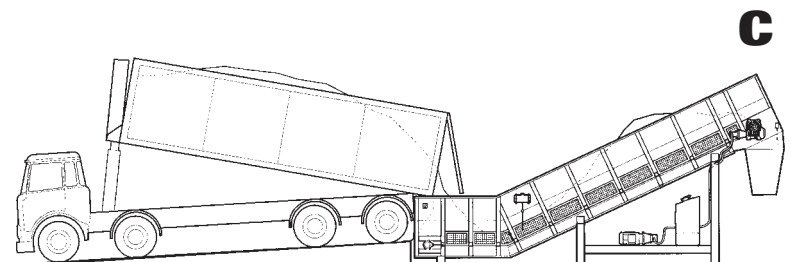
When the truck is empty it departs the Samson™ and the material contained within the Samson™ is continually discharged to the following conveyor system. The material moves forward and the Samson™ entry section is exposed.



The Complete Truck Contents transferred to the Samson™ body

Stage C:

After the first truck has departed the following truck reverses into position. During this time period the forward moving Samson™ apron-belt has exposed the entry section ready to accept the next truck contents.



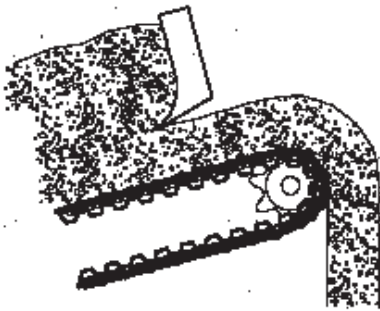
During the Truck Manoeuvring Cycle the Samson™ Entry empties ready to accept the next load

And so it goes on...



Material Stored within the Samson™ body may be at various Load Levels along the length of the Samson™

DISCHARGE RATE CONTROL



As material is transferred from the truck or shovel to the Samson™ the load level varies from zero to 100 % along the machine length.

Since the output rate is proportional to the material bed depth and belt speed it is necessary to regulate the bed depth such that the output rate may be controlled by varying only the belt speed.



Levelling Blade controls the material bed depth at the Samson™ Discharge

The Levelling Blade solution maintains a constant bed depth at the discharge by cutting the peaks into the troughs and enables the final output rate to be closely regulated.

For extremely cohesive materials the rotating Teaser shown right performs the same task by cutting the flow into manageable pieces.





The Samson™ with Deflected Chassis and Parallel Entry (width 3.0 m) receives Broken Glass from both Tipping Trucks and Shovels

BODY AND ENTRY DESIGNS

The Samson™ Deflected Chassis design provides a near horizontal loading section to receive material from tipping trucks to maximise the entry volume and eliminate any risk of the truck tailgate fouling the apron-belt.

For use only with Shovels the Straight Chassis design is adequate to maintain the Samson™ holding volume.

For operation with trucks the access ramp height directly controls the Samson™ entry volume and therefore the time required to discharge the truck.

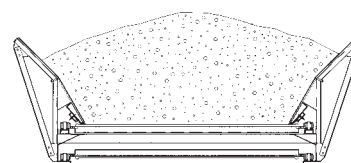
Illustration **A** shows a standard ramp giving a reasonable entry capacity of say 10 tons.

Illustration **B** shows a raised ramp height giving an increased entry volume to reduce the truck tipping time and increase the overall average handling rate.

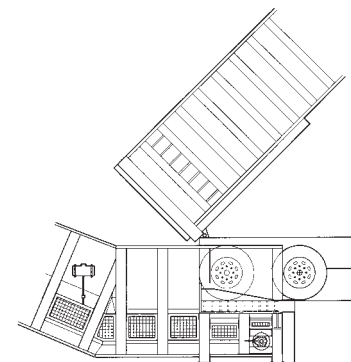
For operation with multiple truck designs the Universal Truck Entry provides total flexibility.



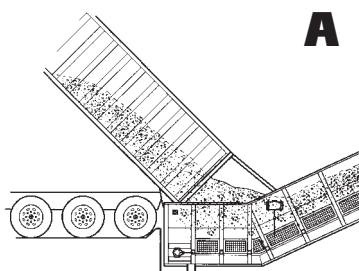
The Samson™ with Straight Chassis and Flared Entry (width 4.5 m) receives Sandy Clay from Shovels



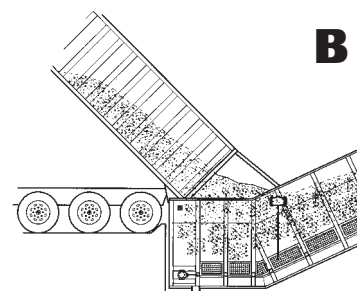
Flare Entry width from 4.0 to 6.0 m.



Universal Truck Entry for All Truck Types



Standard Ramp



Raised Ramp for Greater Entry Volume

The Samson™ is available in five basic design ranges each signified by the chain tension rating known as.

Samson™ 380 for light materials and low duty applications.

Samson™ 450 with its short pitch chain design ideal for medium duty mobile applications where the lowest entry height is required.

Samson™ 450 Super for medium duty continuous process applications typically handling fuels, crushed stone, clinker and similar graded materials.

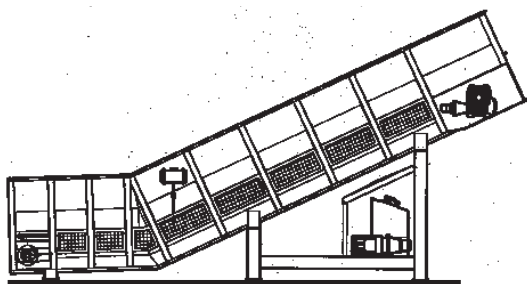
Samson™ 800 for continuous duty applications handling heavier mineral ores and where continuous availability is mandatory.

Samson™ 1600 for extreme duty applications including ROM material sizes and for the most arduous operating conditions.

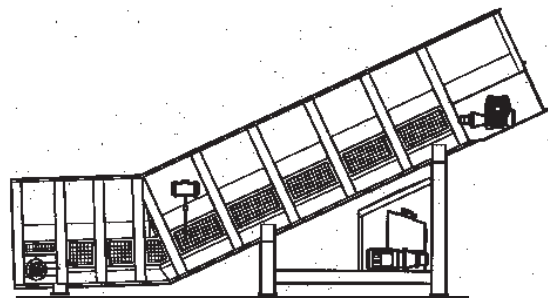


The Massive Samson™ 1600 receives Gabbros Rock from Shovels for Barge Loading at 1,000 t.p.h.

SAMSON™ CONSTRUCTION

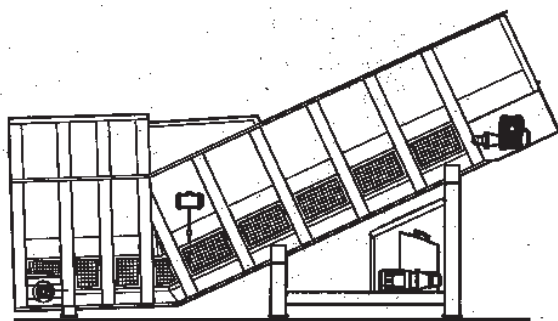


Samson™ 380

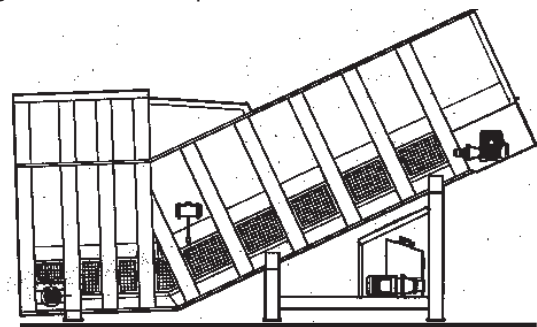


Samson™ 450

The Samson™ construction expands in strength as the chain specification increases



Samson™ 800



Samson™ 1600



The Samson™ with Deflected Chassis and Full Enclosure including Dust Filter receives Cement Clinker

DUST AND FUME CONTROL

The Samson™ Surface Feeder is the ideal solution for the intake of dry and dusty materials where dust pollution is a real hazard.

Material free fall is near zero and the bulk of the truck contents is drawn into the Samson™ body in a controlled stream eliminating particulate separation and therefore virtually eliminating dust pollution at source.

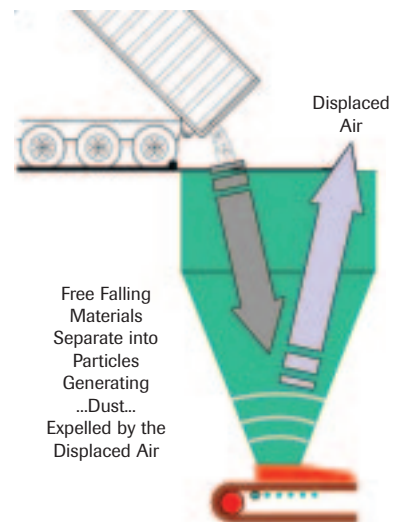
Only when handling the most dusty materials (Cement Clinker for example) is it necessary to provide dust extraction and then only a relatively small air volume is required. Typically only 25% of the rate required for extraction on conventional deep hoppers thus saving not only on capital cost but also on long term operational costs also.



Flow into the Samson™ in a Controlled Stream

With a conventional underground hopper the material falls free allowing particulate separation and generating high velocity displaced air.

The displaced air ejects the dust particles from the hopper at high speed causing extreme fugitive dust pollution with both environmental and health and safety implications.



Conventional Underground Hopper



Resultant Dust Pollution



Enclosure with Fume Extraction for Odious Materials



Mobile Samson™ with Flexible PVC Sheet Partial Enclosure



Full Enclosure with Flexible Entry Curtain but without Dust Extraction



Full Enclosure with Ducted Dust Extraction

ENCLOSURE SYSTEMS



Enclosure with Extended Flared Entry for large Mining Dump Trucks

Fixed enclosures clad in Profiled Steel sheeting over a fabricated steel frame made integral to the body of the Samson™ eliminating the need for additional or separate buildings... less cost... greater flexibility...

The enclosure may be supplied complete in flat-packed components for site assembly or may be manufactured locally with an engineering only package by B&W.

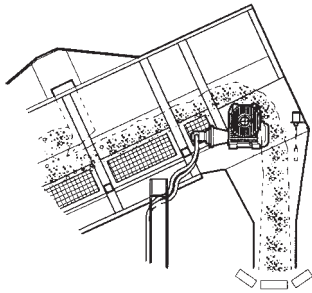


The Samson™ enclosure integrated to a complete coal preparation plant handling ROM material direct from the adjacent open cast mine

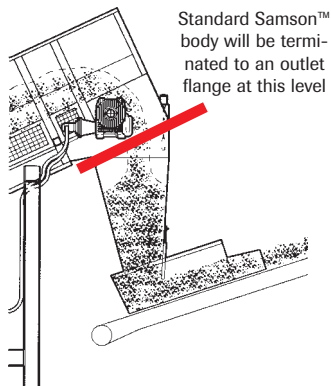


Twin Samson™ Surface Feeders discharge to a Common Belt Conveyor at 90 degrees with Parallel Chutes

DISCHARGE INTERFACE



Parallel Head Chute for 90 degree Transfer



Centralising Head Chute



The Samson™ with a Centralising Head Chute discharges to a conveyor positioned In-Line

The Parallel Head Chute eliminates risk of bridging and blockage when handling cohesive materials and is always the preferred solution where the plant arrangement permits.

Where the ongoing conveyor is in-line or at an angle to the Samson™ then the centralising chute is the only option but generally this solution is less compact and requires an increased discharge height.



Single Screw Feeder provides metered output to a Bucket Elevator



Vibro-Feeder controlling feed rate to a Steep Angle Belt Conveyor

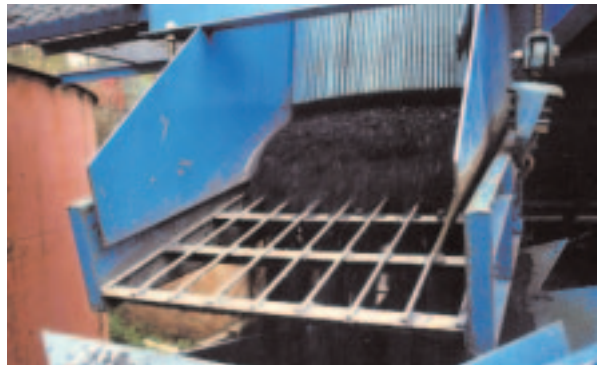


Kleen-Line Belt Feeder transfer to Bucket Elevator

FEEDER OPTIONS



Twin Screws meter output to Progressive Cavity Pump



Vibro-Feeder with Reject Grill to remove over size material

For closely controlled discharge rate down to a few cubic metres per hour a suitable feeder device at the Samson™ discharge is required.

Using the Samson™ head chute as a small buffer hopper the output of the Samson™ is regulated using high a level detector to stop/start the drive and maintain a constant level in the head chute.

Generally not used with a Levelling Blade except in special conditions.

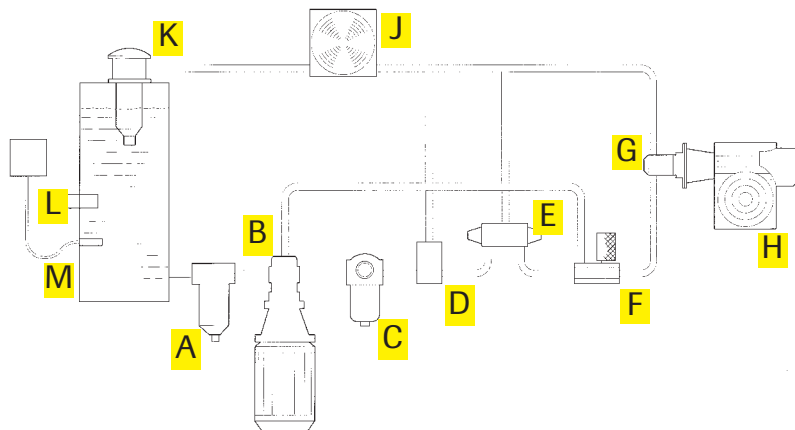


Vibratory Feeder provides regulated output to an inclined belt conveyor



Hydraulic Drive comprising Variable Displacement Hydraulic Pump providing local or remote belt speed control

HYDRAULIC DRIVE



Comprehensive protection and oil filtration systems guarantee long life and reliable operation

A - Suction Strainer.

B - Hydraulic Pump.

C - Pressure Filter.

D - Relief Valve.

E - Solenoid Control Valve.

F - Speed Control Valve.

G - Hydraulic Motor.

H - Reduction Gear.

J - Oil Cooler (where required).

K - Return Line Filter.

L - Reservoir Instrumentation.

M - Reservoir Heater.



Axial Piston Hydraulic Pump Set



Radial Piston Hydraulic Motor



All Samson™ Feeders are supplied as standard with a shaft mounted reduction gear

MECHANICAL DRIVE

Hydraulic drives are available for all machines but are preferred under the following conditions:

Very high torque demand or when dual gear drives are required to equalise the load share on each side of the drive shaft.

Compact high power transmission capacity generally for drives over 55 kW..

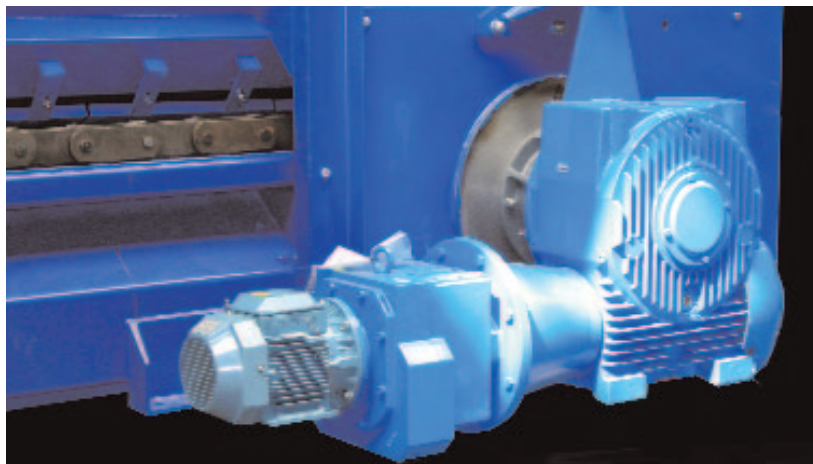
Rapid drive cycling when used with a level detector control in the head chute.

Mechanical Drives provide a less complex alternative and are the preferred solution for:

Continuous output using the Levelling Blade solution thus avoiding rapid drive cycling.

Remotely controlled variable speed is required interfaced to a central process control.

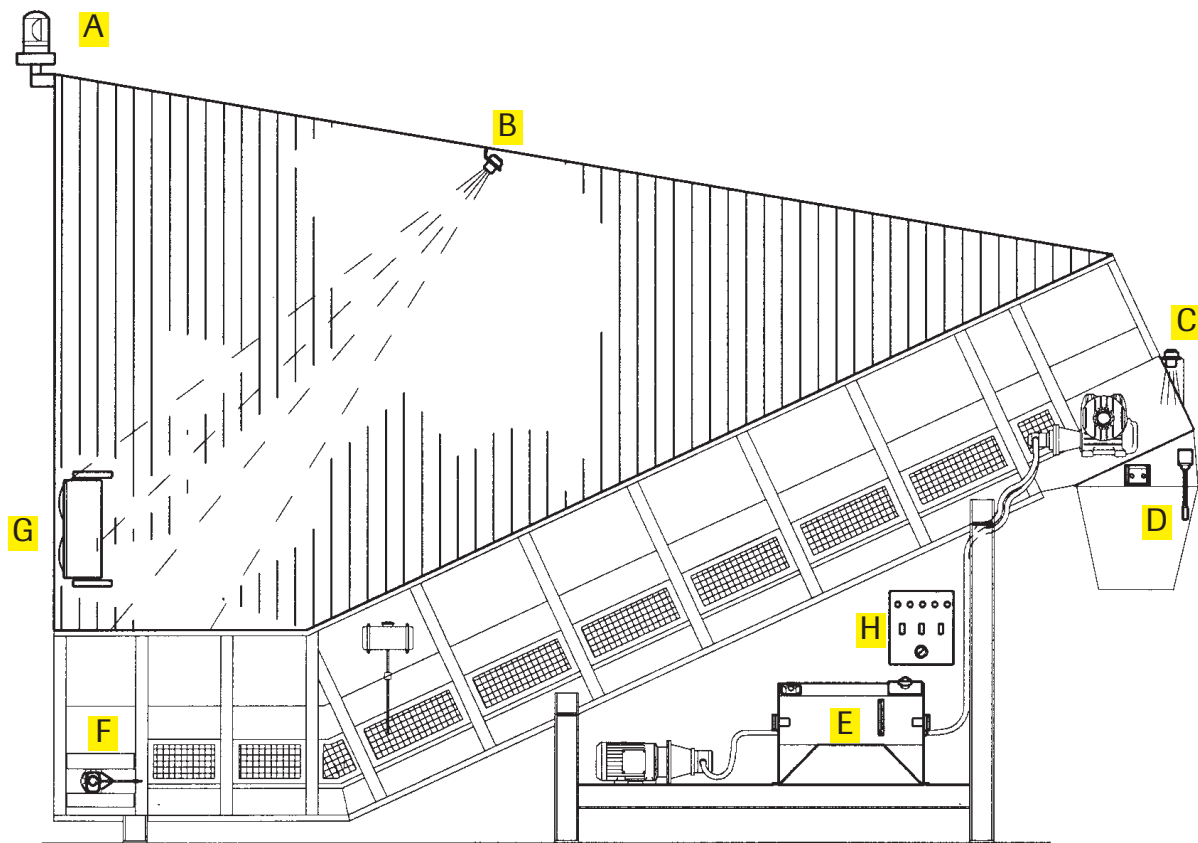
Where there may be a problem with maintenance facilities for hydraulic equipment.



Worm main gear unit with helical primary reduction to achieve the required overall gear ratio



High efficiency Helical/Bevel main reduction gear with helical primary



INSTRUMENTATION

For the safe operation and protection of the Samson™ feeder various items of field instrumentation are available:

A - Rotating Warning Beacon linked to a drive torque monitoring system to warn of impending overload and indicate to the operator to cease filling.

B - Ultrasonic Detector to signal the presence of a vehicle at the Samson™ entry and initiate a controlled startup sequence for the Samson™ and the ongoing plant.

C - When the Samson™ head chutes forms a buffer hopper for an ongoing feeder this Level Detector is linked to the drive control to start the Samson™ on low level and stop on high level, see the diagram or the right.

D - Blocked Chute detector arranged to stop the Samson™ drive if the head chute is over filled or blocked with material.

E - Hydraulic Fluid Reservoir protection systems to inhibit the electric motor in the event of high fluid temperature or low fluid level.

F - Tail shaft Rotation Sensor to inhibit the drive system in the event rotation is lost in normal operation.

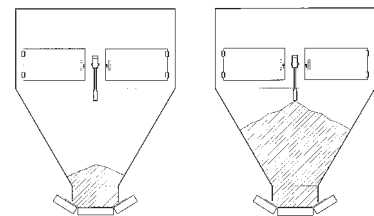
G - Traffic Lamp linked to the ongoing process control to signal either the machine readiness or the grade or type of material required.

H - Local control cabinet plus safety stop system.

Instruments are generally supplied loose but with mounting brackets to fix to the Samson™ or Chutes.



Traffic Lamp Truck Management



Samson™ starts on low level stops on high level

Chute Level Detection for use with an auxiliary feeder or when the ongoing conveyor acts as an extractor to control the feed rate.



Inverter Speed Control Modules located local to the Samson™ but linked to a remote control room

CONTROLS

Variable Output Rate

To control the output rate of the Samson™ feeder using the Levelling Blade system it is necessary to provide variable speed for the Samson™ belt drive.

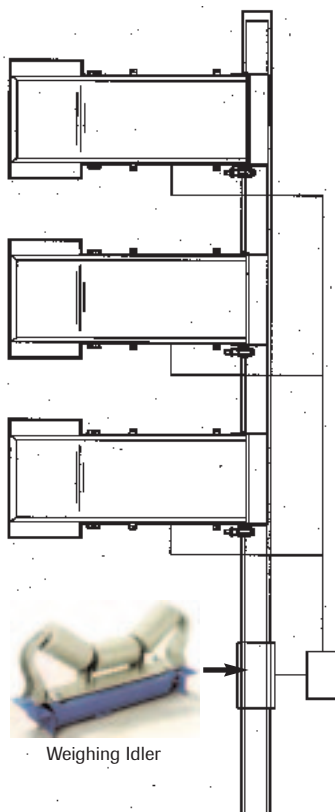
For mechanical drives an Inverter is required to control the motor speed and therefore the belt speed. For a fixed levelling blade height the output rate is proportional to the belt speed.

For hydraulic drives it is necessary to provide an electronic interface for the pump servo allowing for remote speed control using a 4-20 ma signal.

Interfaces

Invariably the Samson™ will be linked to a plant control system for sequencing with other equipment.

The Samson™ may be supplied with a local PLC plus necessary communication protocol compatible with the main plant control systems. Or, supplied with instrumentation only plus such as Inverter unit(s) which will be connected individually to the clients control systems located in the main plant control room.



Blending Systems

When several different materials must be blended onto a common collecting conveyor multiple Samson™ feeders, one for each material type, may be linked to a central controller and arranged to discharge a set blend ratio as a proportion of the total output as measured by a downstream belt weigh idler.



Local Cabinet with Motor Control Gear



Control units are supplied loose for site installation either complete will all necessary motor control and logic gear or as a local control station only linked to an existing central motor control centre (MCC) perhaps located some distance from the equipment.



Twin Rotor Sizer supplied with the Samson™ 1600 Series feeder receives ROM Limestone for crushing down for onward conveying

SIZING AND SCREENING

The Samson™ may be supplied complete with integral rotary crusher or screening equipment to size the raw material before onward conveying, either as a package or engineered to suit client's free issue equipment.

For fixed plant the Samson™ may be integrated to permanent building structures as illustrated right receiving Limestone from large mining dump trucks.



Samson™ supplied with Vibrating Screen to remove oversize material before onward conveying



The Samson™ 800 Series provides 100 cubic metres of live storage for Alternative Fuels in a Cement Plant.

LIVE STORAGE SOLUTIONS

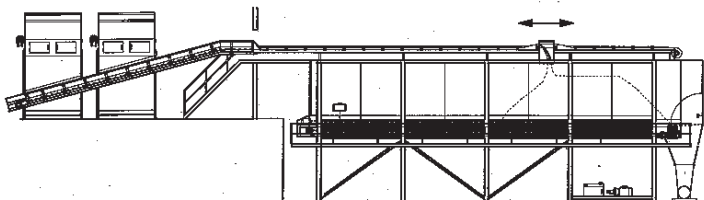
For handling difficult materials that are liable to bridge and block in conventional silos the Samson™ offers the ideal solution for live storage with holding capacities up to around 200 tons.

Illustrated above and right the conventional Samson™ design with horizontal loading section and inclined discharge, with this arrangement the storage volume is generally limited by the increased chain tension required to raise the load.

Illustrated below a specialised application for the storage of Sewage Sludge including twin Samson™ surface feeders each with belt conveyor transfer to two Samson™ horizontal storage units within the building able to store and discharge on demand.



Extended Inclined Section for increased storage or discharge height



The Samson™ Horizontal Storage Bunker with Overhead Conveyor and Plough Discharger





The Side Loading Samson™ receives Cement Clinker for import directly to an existing conveyor installation

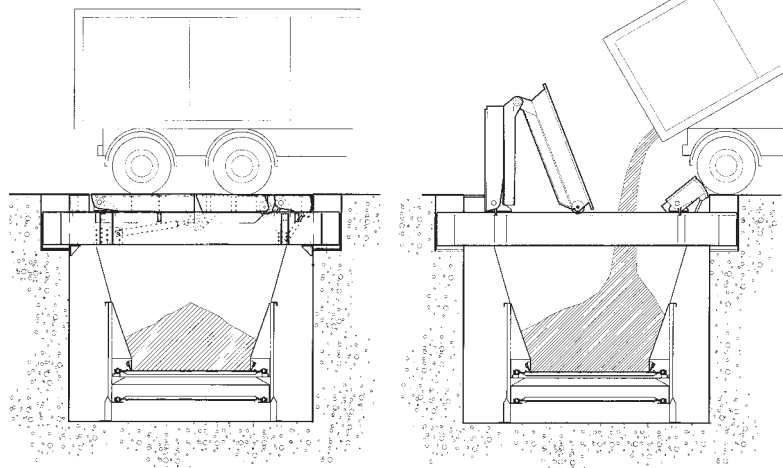
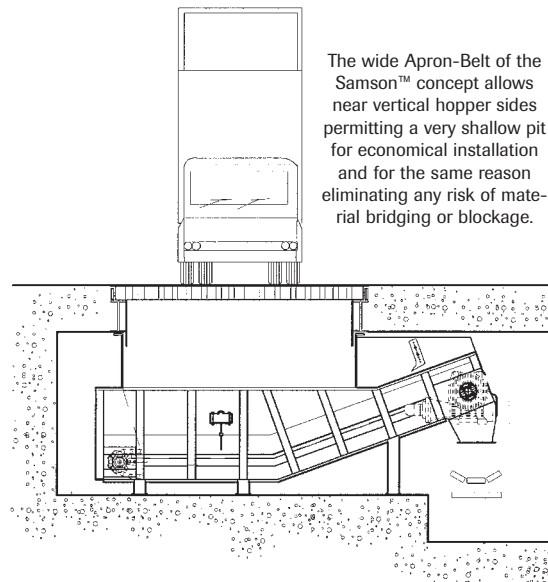
In confined spaces the Side Loading solution may provide an economical alternative allowing a simplified plant layout with reduced transfer points and minimum disruption to the process operation during the new equipment installation.

Side loading is particularly suited to drive-over-tip applications where the Samson™ may be mounted below floor level or supplied with a suitable ramp allowing the trucks to drive over the Samson™ entry section, tip and continue in the same direction, as illustrated right and below.

SIDE LOADING and DRIVE OVER TIPPING

In drive over projects handling free flowing materials a simple grill only is required to support the truck and allow material to pass through.

However, for cohesive materials such a grill may blind and block and for this condition the drive over door system was developed comprising hydraulically operated doors allowing the truck to drive over and, after the doors have automatically opened, discharge direct to the Samson™ below without hindrance.





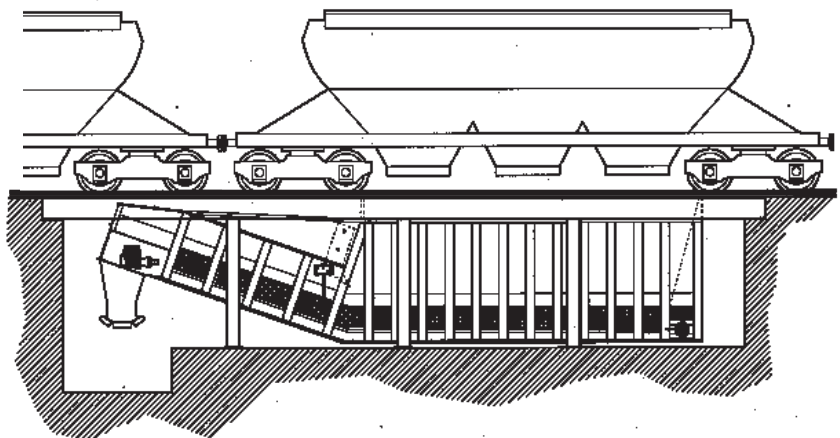
Discharge facility for Hopper Bottom Railcars receives coal for a Cement Plant including a Samson™ feeder with 80 tons holding capacity

RAILCAR DISCHARGE

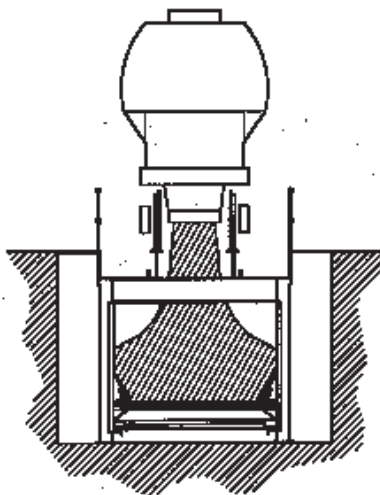
The Samson™ solution for Railcar discharge may be implemented in a shallow pit, typically with depth only 4.0 metres, ideally suited in port area with high ground water level or where working on hard rock increases the cost of the excavation which with a conventional tapered hopper could be as much as 14 metres deep to obtain the necessary hopper angle for reliable material flow handling such as industrial coals etcetera.

With a shallow pit the material free fall is minimised and, since the Apron-Belt of the Samson™ feeder is wider than the typical railcar, the material flows outward reducing the velocity of the displaced air and thereby reducing dust generation.

With the deflected chassis design the raised discharge provides an ideal transfer to the following conveyor which, thanks to the shallow pit depth, may be of reduced length and therefore reduced energy input saving on capital and running costs.



The Wide Apron-Belt Samson™ Concept permits a Shallow Excavation and Economical Installation





The Samson™ Feeder integrated to this Mobile Shiploader permits direct bulk export from Truck to Ship

MOBILE SHIPLOADER and STACKER with INTEGRAL SAMSON™ SURFACE FEEDERS



The B&W Stormajor™ with integrated Samson™ 1600 Series Feeder and Radial Stacking Boom for Barge Loading



The B&W Stormajor™ combines the benefits of a Samson™ Surface Feeder with a Radial Stacking Boom mounted to a common mobile chassis.

AFTER SALES SERVICE

B&W Mechanical Handling Ltd., within the Aumund Group, strive to deliver the highest standards of customer support and after sales service worldwide with the collaboration of the local Aumund Group daughter companies and representative offices and including: -

- **Application advice.**
- **Conceptual Plant Layout.**
- **Plant Selection and Specification.**
- **Supervision of Installation.**
- **Commissioning.**
- **Advice on Maintenance Programmes.**
- **Rebuilding and Refurbishment.**
- **Genuine Spare Parts.**
- **Service Contracts.**

Our engineers are highly trained and experienced in the B&W products and familiar with the demands of continuous process industries where plant availability is critical.



Illustrated above the B&W site supervisor demonstrates the proper fitting of the conveyor belt over the Samson™ Apron-Bars.

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