

McLANAHAN

McLanahan Mineral Processing Equipment

May 2017

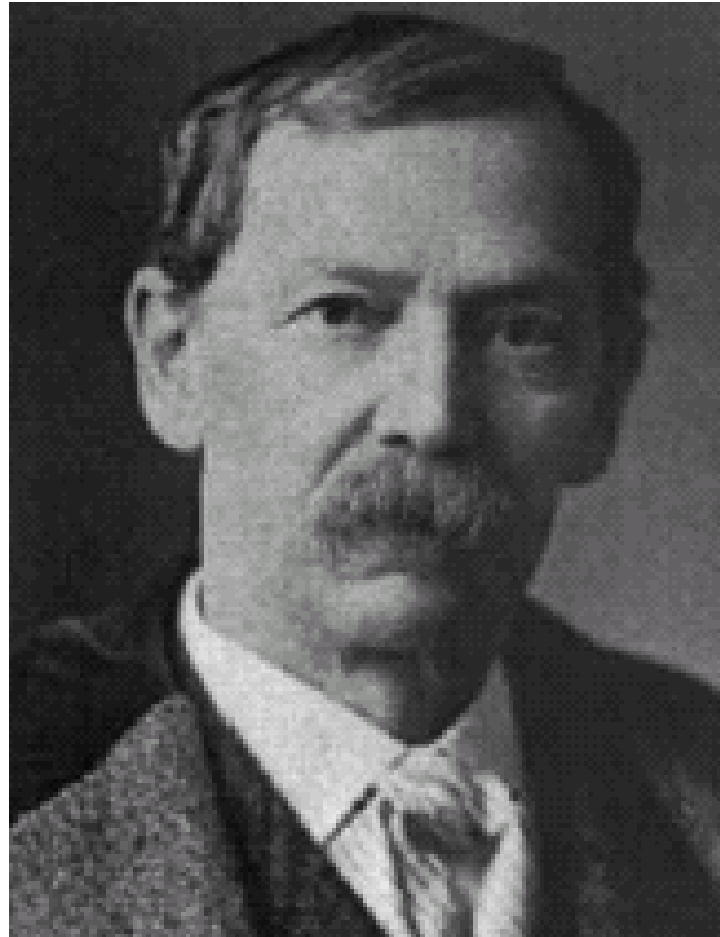


Established in 1835 - Original Foundry

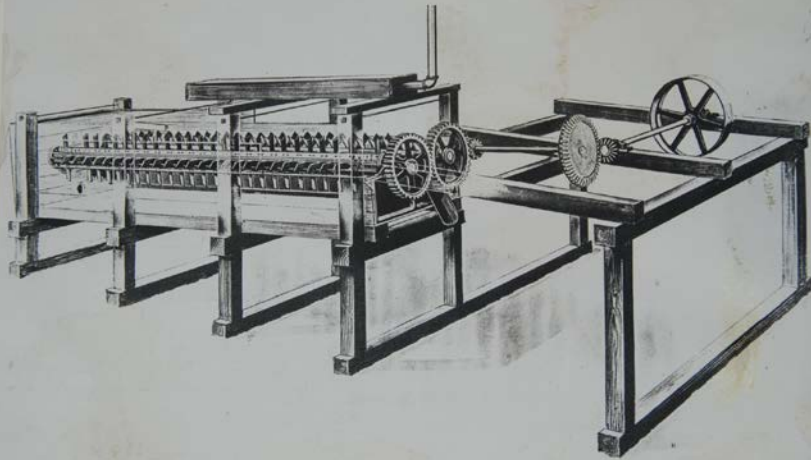


Expanding into Manufacturing

**Samuel
McLanahan, 2nd
Generation,
broadened our
focus from a
Foundry to include
the manufacture of
process equipment
in the late 1800's.**

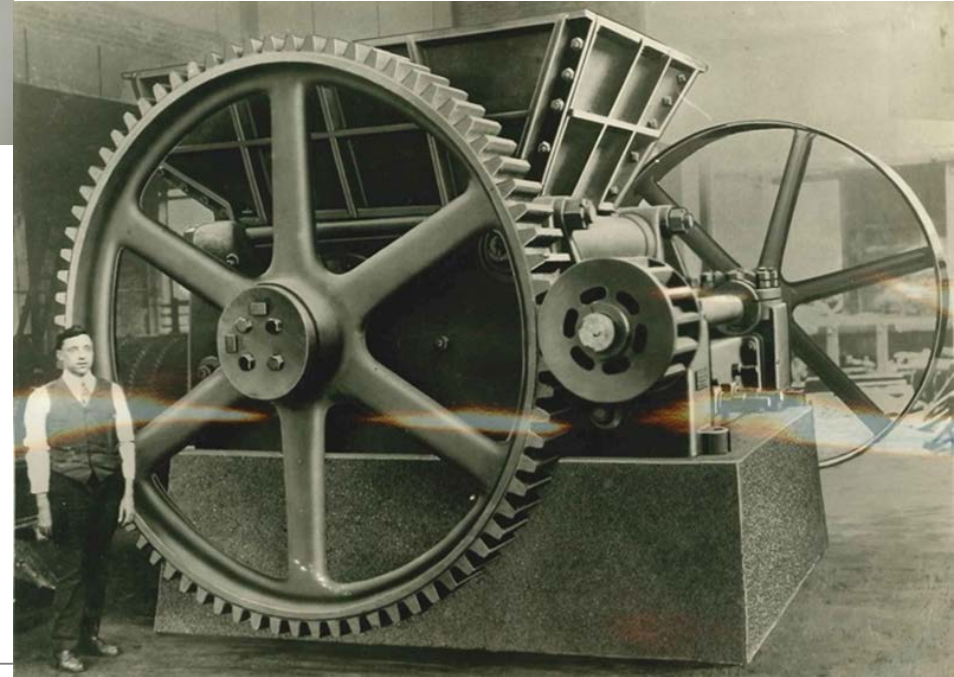


Early Inventions



Log Washer - 1890

Single Roll Crusher - 1896



From that start, McLanahan Corporation has developed a complete line of Processing Equipment & Systems designed for:

- Crushing
- Feeding
- Scrubbing/Washing
- Screening
- Classifying
- Dewatering
- Mixing
- Sampling

2010 Aerial View of Corporate Office, Hollidaysburg PA



LOCATIONS



U.S. Locations

- Hollidaysburg, PA (Corporate)
- Gallatin, TN
- Cedar Rapids, IA (Universal)
- Des Moines, IA (EIW)



International Locations

- Newcastle, NSW, Australia
- Mackay, QLD, Australia
- Perth, WA, Australia
- United Kingdom
- Hyderabad, India
- Kolkata, India
- Moscow, Russia
- Santiago, Chile

Mineral Processing

McLanahan specializes in crushing equipment and process solutions for all types of materials such as coal, salt, gypsum, limestone, iron ore, potash, phosphate and more.

Roll Crushers
DDC-Sizers
Jaw Crushers
Impactors
Hammermills
Feeder-Breakers
Drag Feeders
Reclaim Feeders
Rotary Breakers
Scrubbers
Filter Presses
Dewatering Screens
Separators
Thickeners
Pug Mill Mixers



Sampling

We offer a wide range of innovative sampling solutions systems for coal, coke, copper, precious metals, salt, sand, stone, gravel, iron ore, and other bulk materials.

Coal & Mineral Samplers:

- Single Stage Systems
- Two Stage Systems
- Three Stage Systems
- Truck Auger Systems
- System Components

Cut Zone System

Aggregate Samplers

Tramp Removal Systems

Hammermill Sampling Crushers



Aggregate Processing

McLanahan specializes in solutions for sand and gravel and road based aggregates production.

Everything required for :

- Crushing
- Scrubbing
- Separating
- Classifying
- Conditioning
- Dewatering
- Pumping

- Ultra Fines Recovery Plants
- Separator Systems
- Thickeners, Screw Washers
- Conditioners, Sand Tanks
- Dewatering Screens
- Cyclones & Separators
- Hydro-Sizers, Scrubbers
- Log Washers, Sumps & Pumps



Tailings/Water Management

McLanahan features Recessed Plate Filter Presses and High Frequency Vibrating Screens for dewatering various types of slurries as well a full line of Pug Mill Mixers and Trommel Screens.

Applications:

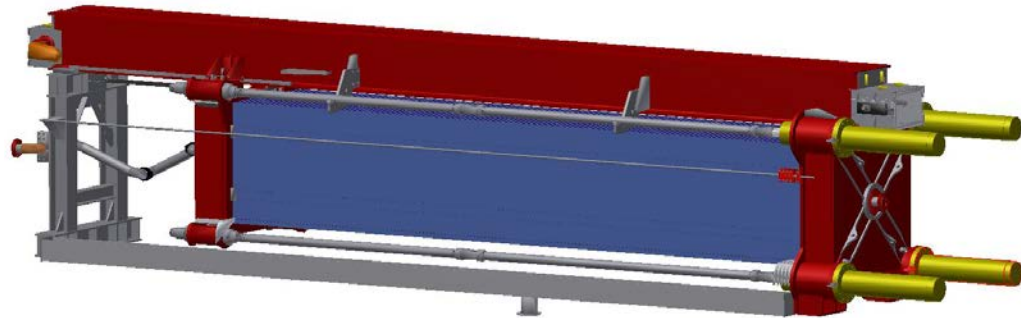
Mineral

Aggregate

Pulp/Paper

Waste Treatment

Food Processing



Manure Management

McLanahan provides a wide range of products & systems to fit all Sand Solution needs for Dairy Manure Management .

Sand Separators

Sand Stall Fillers

Manure Augers

Sand Pumps

Nutrient Separation

**Engineering Design
Service**



Foundry & Machining

Our Foundry & Machining business is a “Single Source” supplier for pattern making, iron & steel castings, and machining.

Pattern Making

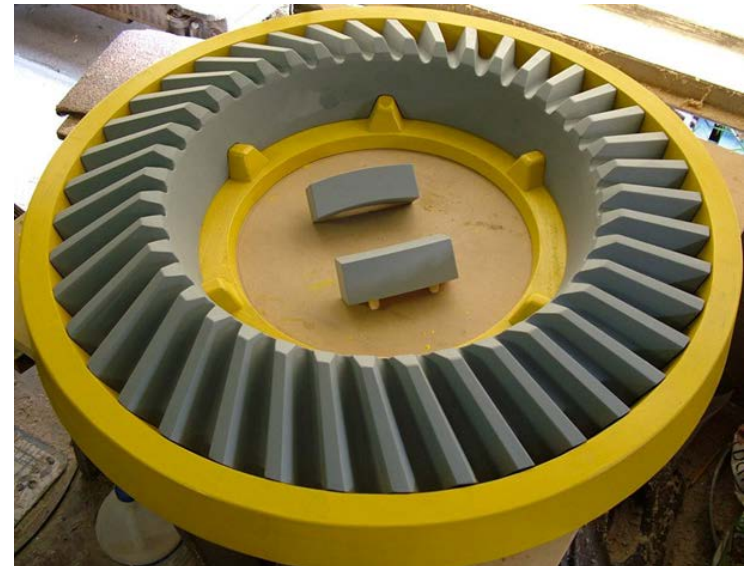
Foundry

Machining

Fabrication

Assembly

Blast & Paint



Acquisition of Universal Engineering

January 1, 2012 McLanahan Corporation acquired Universal Engineering of Cedar Rapids, Iowa, a well known company that manufactures long lasting equipment for Aggregate and Mineral Processing.

Primary and Secondary Impact Crushers

Jaw Crushers

Industrial Hammermill Crushers

Apron and Wobbler Feeders

Vibrating Grizzly and Pan Feeders

Horizontal Screens

Portable Plants



Primary Impact Crushers

3 Different Styles of Primary Crushers
12 Models to Choose From
Capacities Range from 400 - 3000 STPH



New Holland



Andreas



MaxCap

Secondary Impact Crushers

10 Models to Choose From
Capacities Range from 150 - 845 STPH
Custom Designed for Aggregate or Recycling



VersaCap



NGS



RCP/BCPR

Jaw Crushers

27 Models to Choose From
Capacities Range from 5 - 2700 STPH
Available Hydraulic Toggle



H Series Jaw Crusher



Std. Jaw Crusher



Clinker Breakers



Hammermills



Roll Crushers

Specialty Crushers & Industrial Mills

Custom Engineered
Crushers and Mills
Designed For Your Specialty Application



UniScreen

Screens & Feeders
Universal Offers a Full Line of
Screens & Feeders
For Your Sizing & Material Handling Needs



Vibrating Pan
Feeders



Wobbler Feeders



Apron Feeders



Vibrating Grizzly
Feeders

Acquisition of Eagle Iron Works (EIW)

November 30, 2012 McLanahan Corporation acquired the assets of Eagle Iron Works (EIW) of Des Moines, IA. Another well known company who is a strong supplier of Aggregate Equipment.



Overview: Mineral Processes and Products

CRUSHING/BREAKING

Roll Crushers, DDC-Sizers, Feeder-Breakers, Rotary Breakers, Jaw Crushers, Impact Crushers, Hammermills

FEEDING

Drag Feeders, Apron Feeders, Reciprocating Plate Feeders, Vibrating Grizzly and Pan Feeders, Wobbler Feeders

SCRUBBING

Rotary Scrubbers, Log Washers

MIXING

Pug Mill Mixers

DEWATERING

Vibratory Dewatering Screens, Thickeners, Recessed Plate Filter Presses

Roll Crushers

BELT DRIVEN

Single Roll
Double Roll
Triple Roll
Quadroll



DIRECT DRIVE CRUSHERS (2 roll crushers with gearbox)

Primary DDC-Sizer
Secondary DDC-Sizer
Tertiary DDC-Sizer
*Shalemaster Twin Roll (For soft, sticky material)



V-Belt Drives

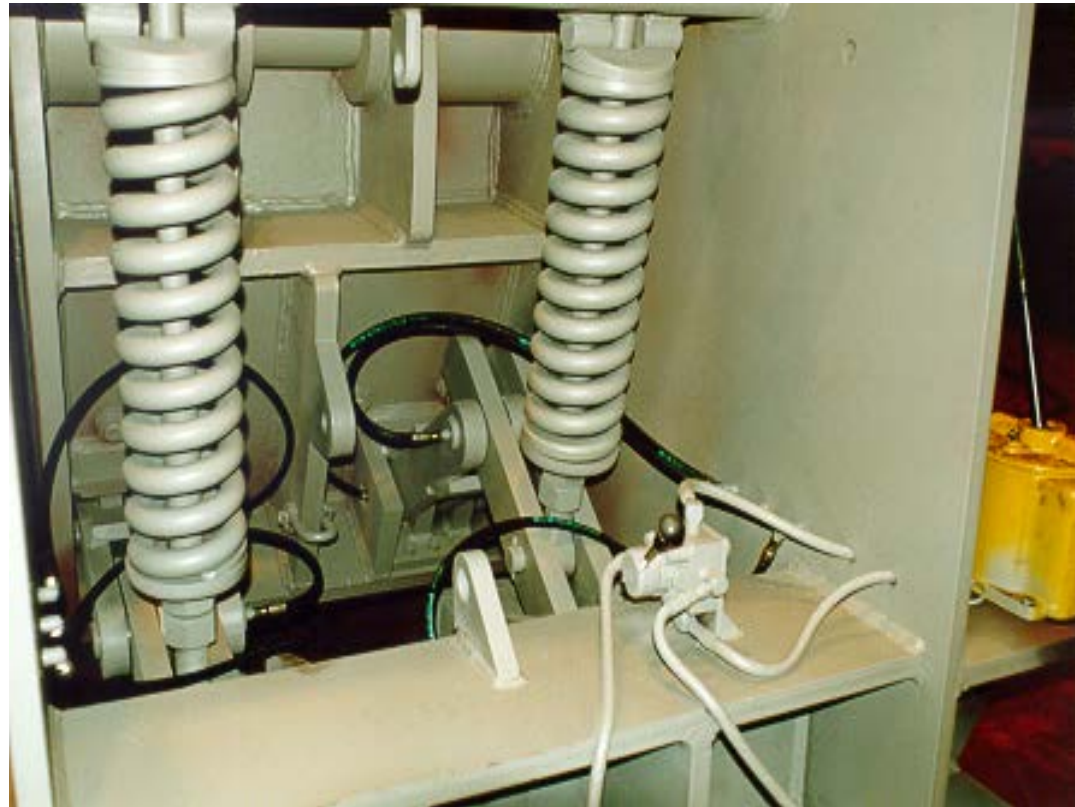
McLanahan Roll Crushers employ V-belt drives consisting of an electric motor with drive sheave connected by a series of V-belts to a larger driven sheave or flywheel. The flywheel is connected either directly to the crusher roll shaft or to an intermediate “countershaft” to reduce the roll speed.



Tramp Relief

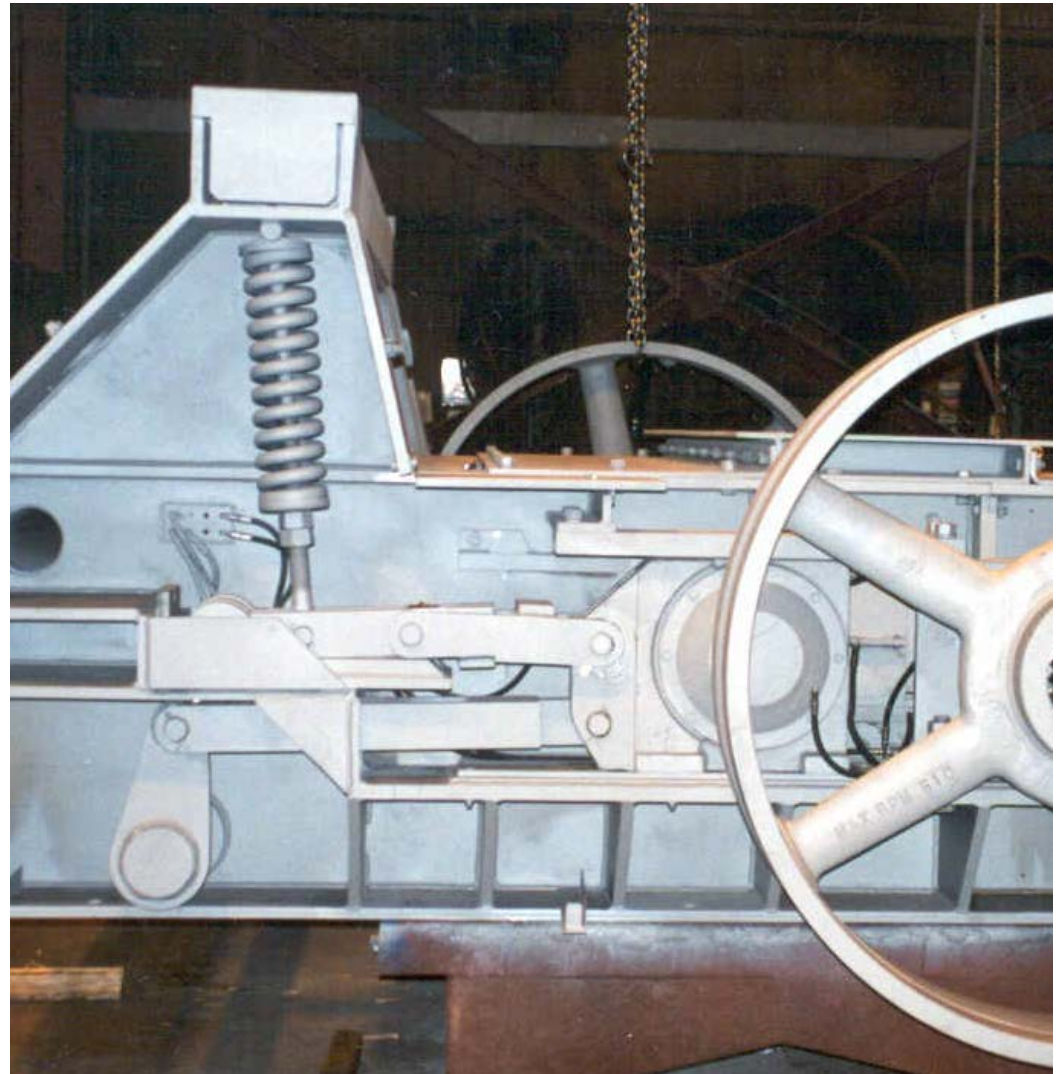
The McLanahan tramp relief systems employed on Roll Crushers is a mechanical spring and toggle device that “breaks open” separating the crushing plate and roll, or opposing rolls, to pass uncrushable material then return automatically to the previous setting.

On Single Roll Crushers and the top stage of Triple Roll Crushers, the spring and toggle device is attached to the hinged crushing plate.



Tramp Relief

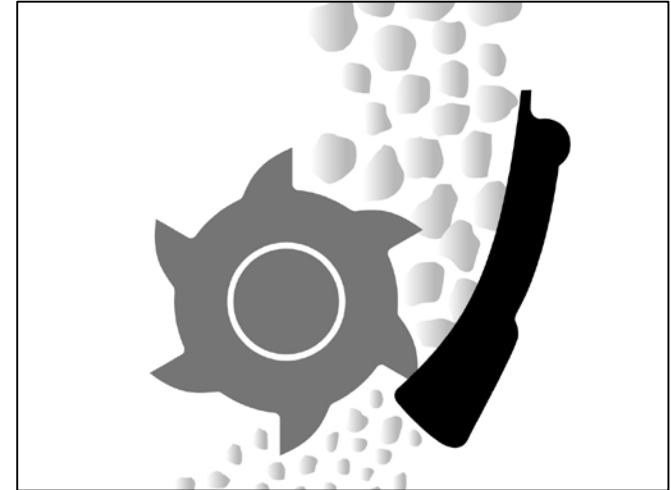
On Double Roll Crushers, the bottom stage of Triple Roll Crushers and both stages of Quadroll Crushers the spring and toggle mechanism is attached to the moveable roll on each side of the crusher.



Single Roll Crushers

Used for primary crushing due to high reduction ratio, large throat opening and increased nip angle. Reduces large feed material efficiently eliminating slabs and reducing fines.

- Large Feed Opening
- Low Roll Speed
- Up to 6 to 1 Ratio of Reduction
- Cubical product
- High Capacity
- Minimal Fines Generation
- Minimal Maintenance



Single Roll – Duty Classes/Applications

Single roll crushers are available in several duty classes designed to handle friable materials such as clean coal and salt to the toughest applications including 100% hard rock

COBRA - Clean Coal, Frozen Coal, Lime, Coke, Salt, Ideal for wet sticky feeds

BLACK DIAMOND – Coal, Salt, Soft Shale, Cinders, Brick, Coke, Phosphate, Potash

SUPER BLACK DIAMOND – Shale, Slate, Gypsum, Bauxite, Coal with friable Rock

ROCKMASTER – ROM Coal with Hard Rock, Various Ores, Mine Refuse

Roll diameters from 450mm to 1200mm

Roll widths from 600mm to 1800mm

Product sizing from 50mm to 400mm

Capacities up to 1800 MTPH



Double Roll Crushers

Wide range of roll speeds

4 to 1 ratio of reduction

Capacities up to 5400 MTPH

Cubicle product with minimal fines

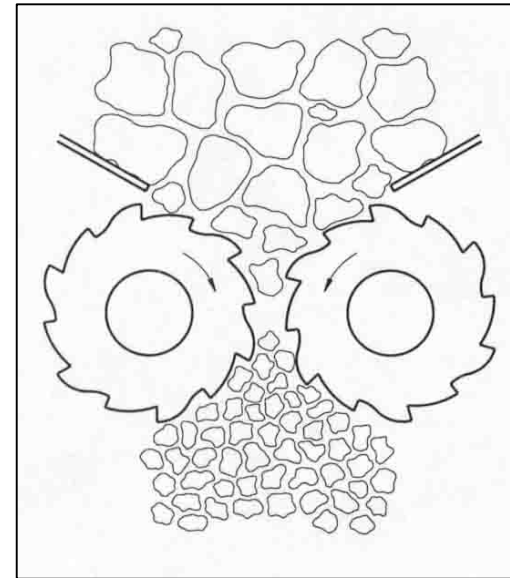
Product size ranging from 3mm to 150mm

Finer product capability

Ability to handle wet sticky feeds

Roll diameters from 450mm to 1800mm

Roll widths from 450mm to 3000mm



Double Roll – Duty Classes/Applications

Primary, Secondary and Tertiary crushing of friable minerals to 100% rock

Black Diamond - Heavy Duty



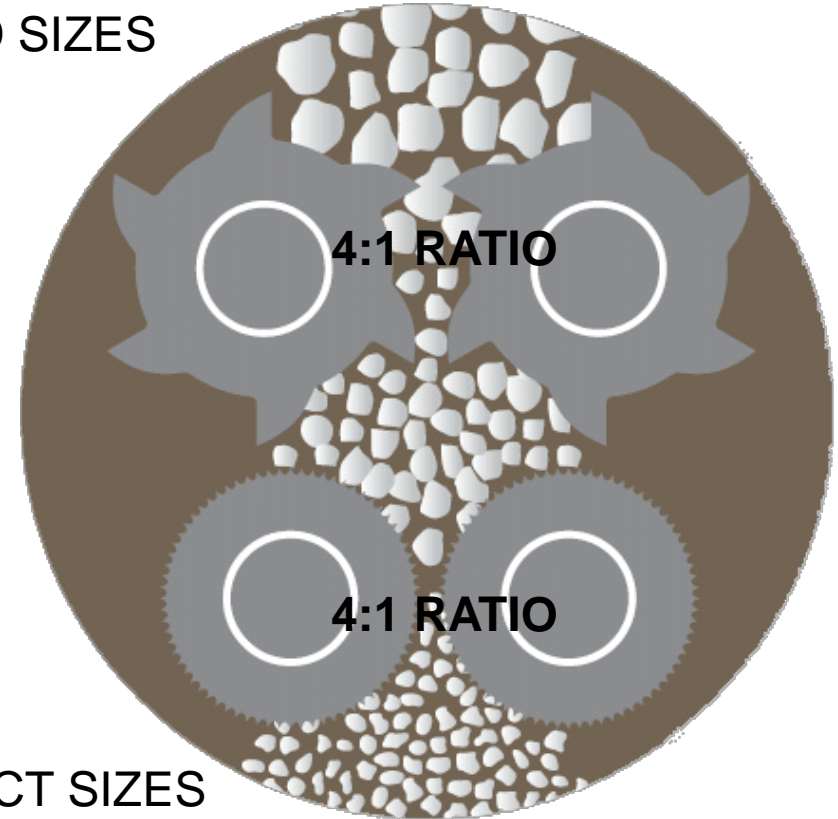
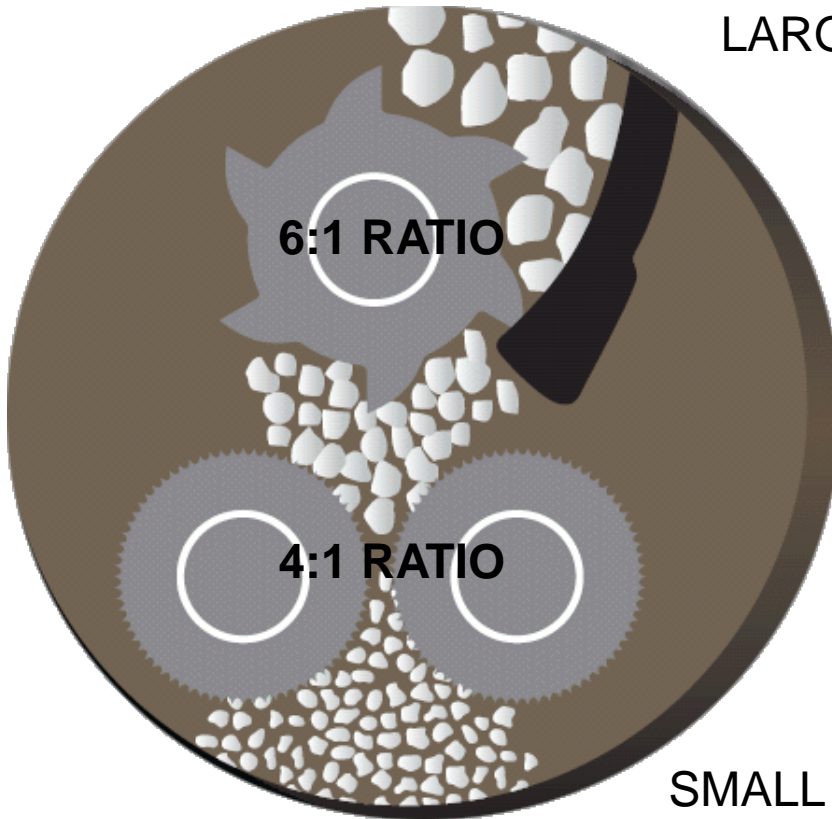
Black Diamond – Clean Coal, Coke, Salt, Potash, Quicklime, Pebble Lime, Burnt Lime, Glass

Heavy Duty – ROM Coal with Refuse, Limestone, Gypsum, Trona, Shale, Bauxite, Oil Shale, Various Ores, Phosphate

Two-Stage, Triple Roll and Quadroll Crushers

TWO STAGE CRUSHERS

HIGH RATIO OF REDUCTION
LARGE FEED SIZES



SMALL PRODUCT SIZES
MINIMUM FINES
CUBICAL PRODUCT
HIGH CAPACITIES

Two-Stage Triple Roll Crushers

Duty Classes/Applications

Standard Duty – Two Stage Reduction of Clean Coal, Salt, Potash, Coke, Glass

Medium Duty – Two Stage Reduction of Harder Coal and Feeds Containing Medium Hard Shale

Super – Two Stage Reduction of Harder Coal and ROM Feeds Containing up to 10% Rock

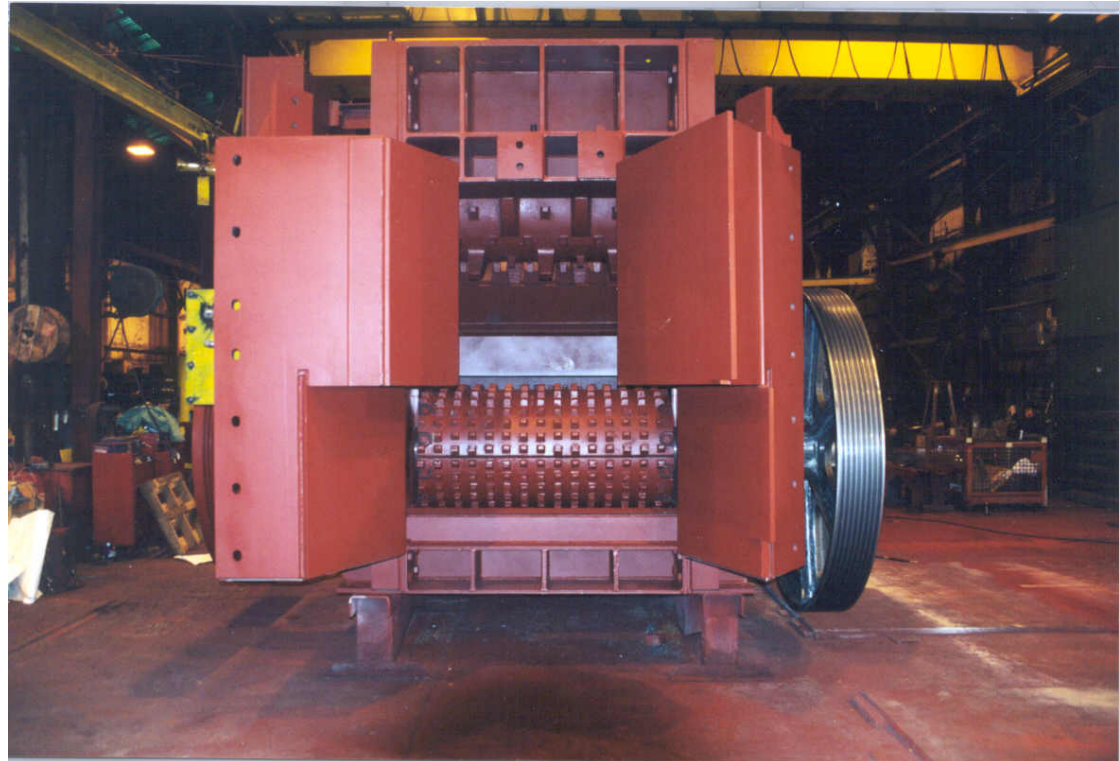
Large Feed Opening

Large Ratio of Reduction

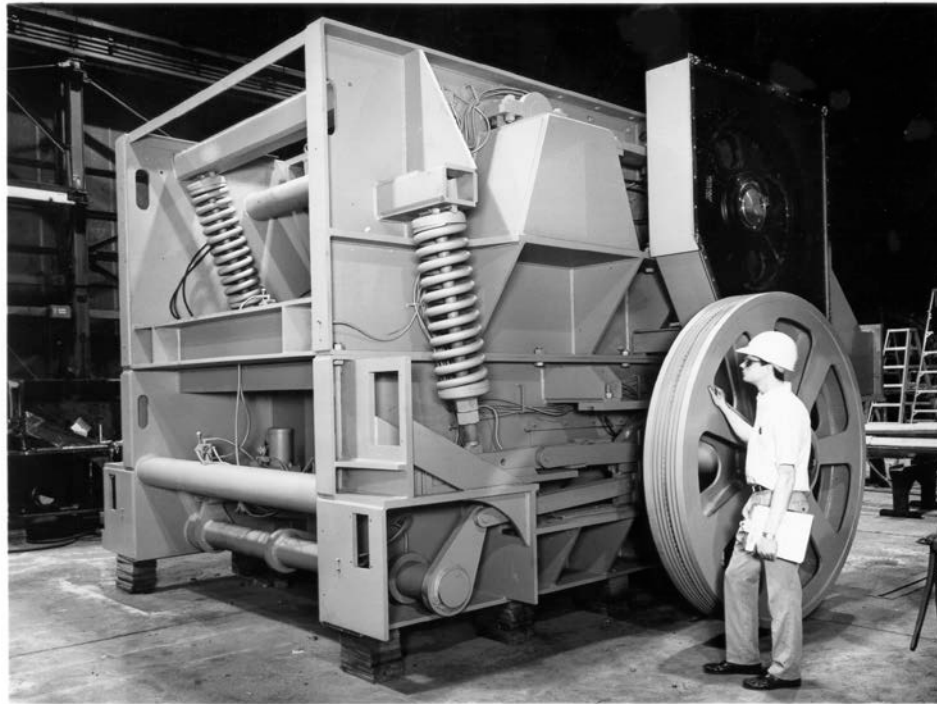
Wide Range of Roll Speeds

High Capacities

Primary, Secondary and
Tertiary Crushing



Two-Stage Triple Roll Crushers



Final product sizing ranging from 3mm to 75mm

6:1 and 4:1 Ratios of Reduction

Capacities up to 5,400 MTPH

V-Belt or Chain & Sprocket
Interstage Drive

1, 2 or 3 Motor Drive(s)



Two-Stage Quadroll Crusher

Duty Classes/Applications

Standard Duty – Two Stage Reduction of Clean Coal, Salt, Potash, Coke, Glass

Medium Duty – Two Stage Reduction of Harder Coal and Feeds Containing Medium Hard Shale

Abrasive Duty – Two Stage Reduction of Hot Abrasive Feeds Such as Sinter, Iron Ore and Coke

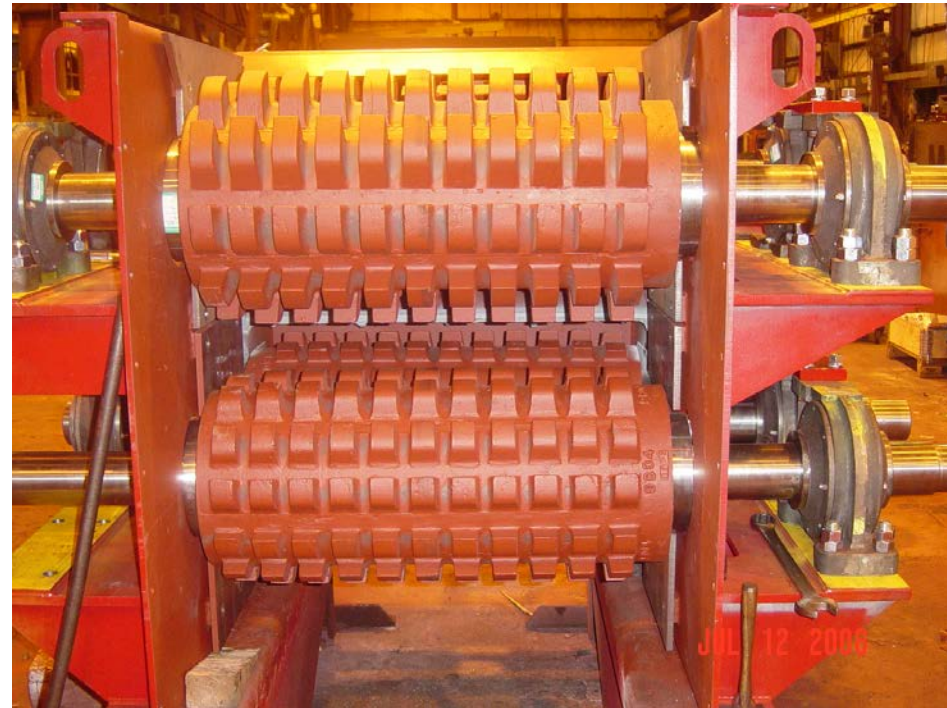
Super – Two Stage Reduction of ROM Coal Containing Moderate Percentages of Medium Hard Refuse and other similar material

Large Ratio of Reduction

Wide Range of Roll Speeds

High Capacities

Primary, Secondary and Tertiary
Crushing



Two-Stage Quadroll Crusher

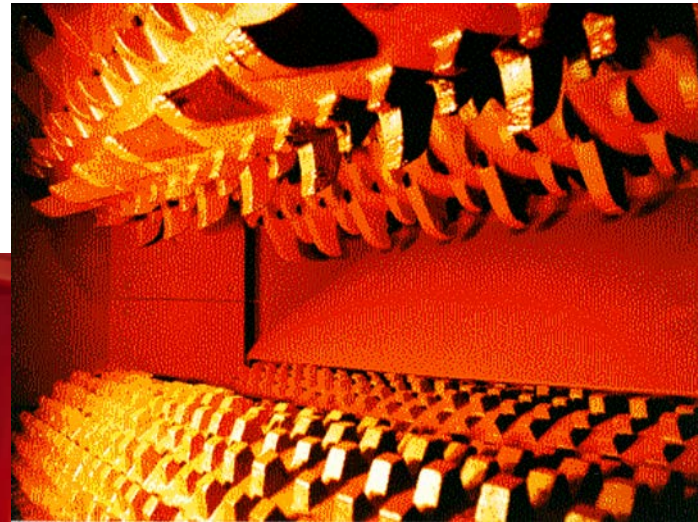
Final Product Sizing Ranging as Low as 6mm

4:1 and 4:1 Ratios of Reduction

High Capacities

V-belt or Chain & Sprocket
Interstage Drive

2, 3 or 4 Motor Drive(s)



Direct Drive Crushers – DDC-Sizers

For crushing ROM Coal, Lignite, Limestone, Phosphate and Various Ores at a 4:1 Ratio of Reduction

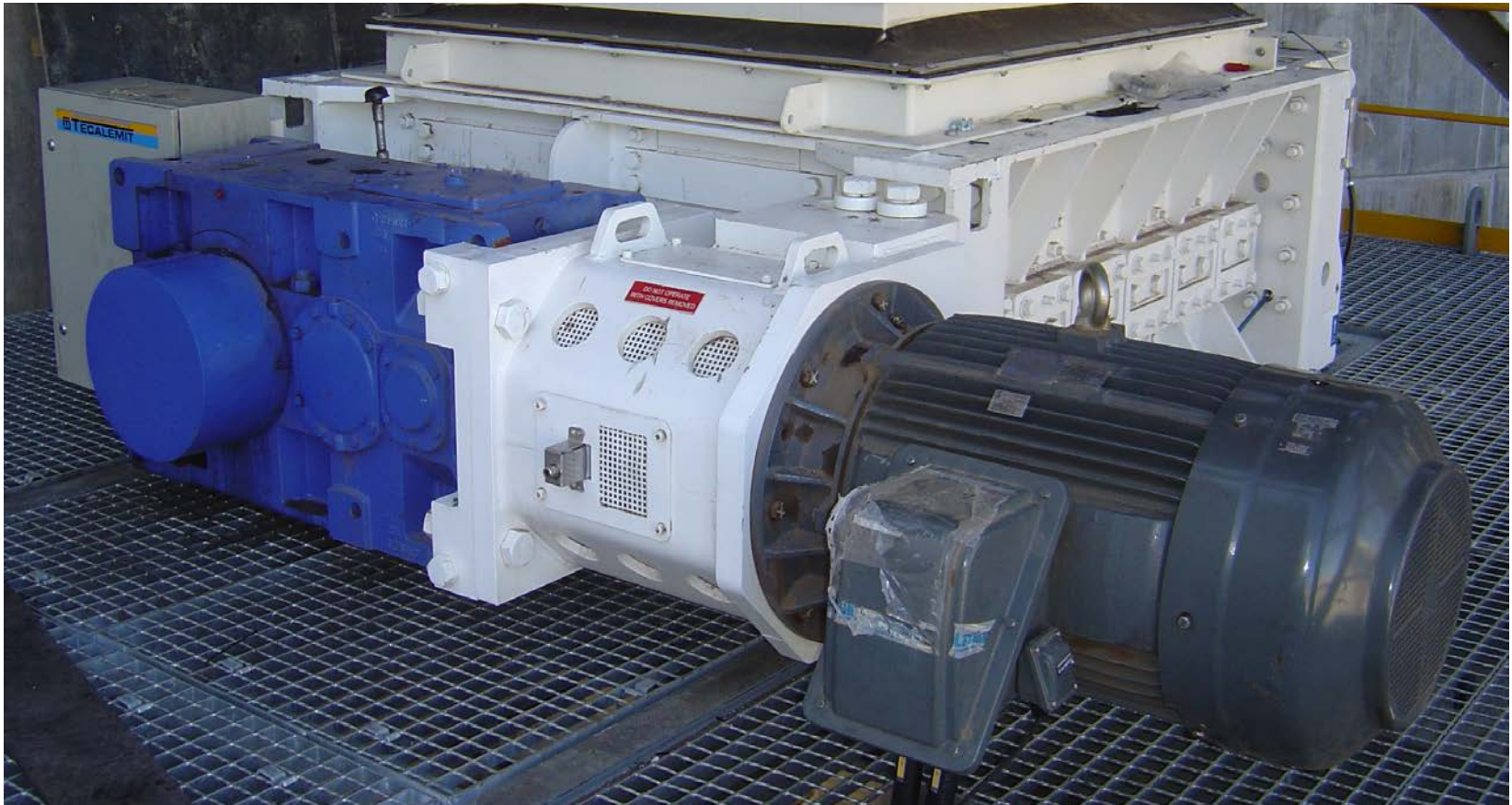
Low Profile
Low Roll Speeds
Less Fines
Large Feed Opening
Product Size Adjustment
Wheel Mounted

Capacities up to 7,200 MTPH



Shaft-Mounted Mechanical Drives

McLanahan DDC-Sizers employ a shaft-mounted, right angle gear reducer driven through a fluid coupling by electric motor.



Shaft-Mounted Hydraulic Drives

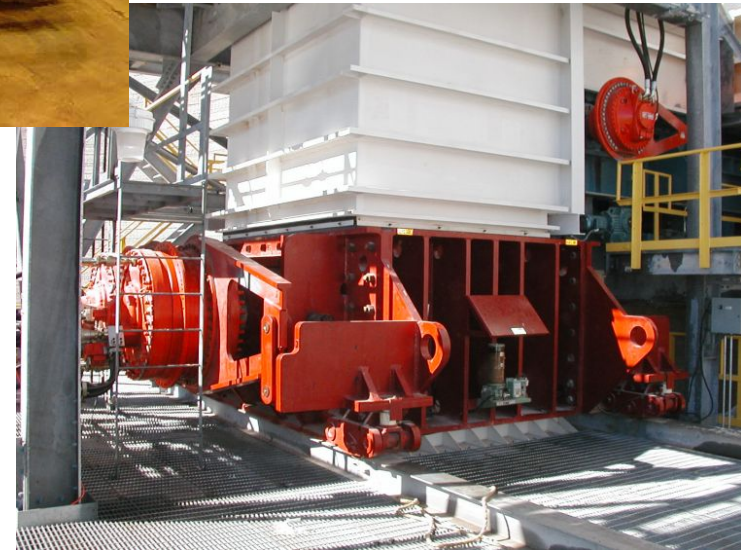
For the most difficult crushing applications hydraulic drives are recommended to provide a “cushioning effect” and extended life to the drive and shaft components.



Low Speed

High Torque

Direct Mounted to the Roll Shaft



Feed Opening provides a Screening Effect

Sizers are fed the full length and width of the crushing rolls which allows undersize material to flow freely through the openings in the crushing zone and along the backside of the rolls. Therefore, undersize material is not re-crushed creating additional fines.



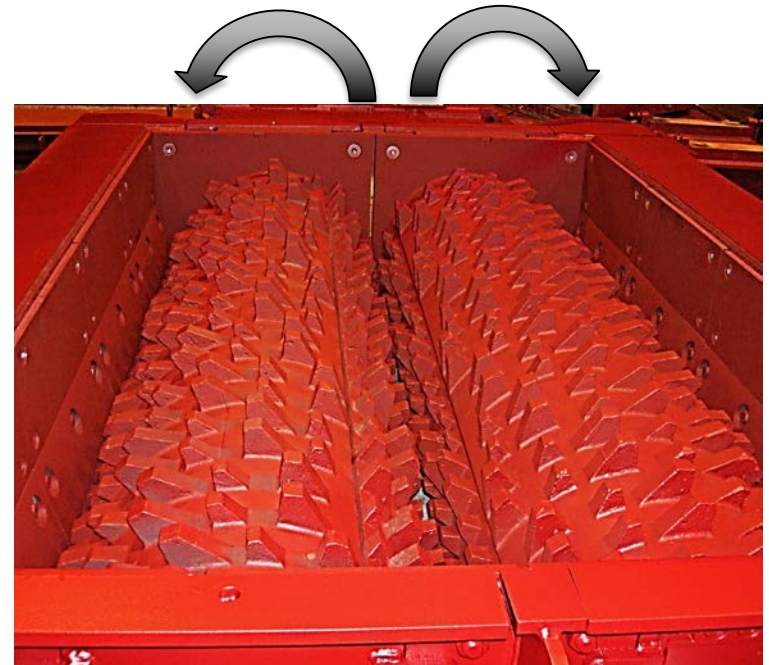
Primary, Secondary and Tertiary DDC-Sizers

PRIMARY and SECONDARY DDC-SIZERS
Crush To the Inside



Primary Product Sizes of 200mm – 400mm
Secondary Product Sizes of 100mm – 150mm

TERTIARY DDC-SIZERS
Crush To the Outside

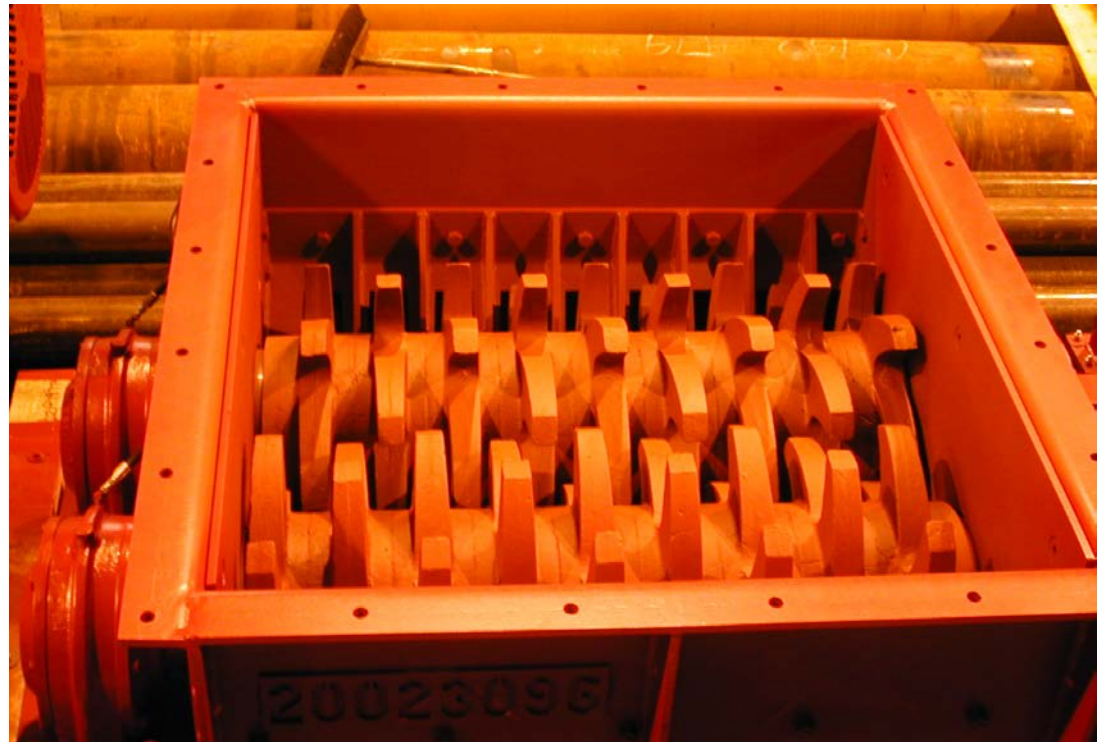


Product Sizes of
50mm – 75mm

Shalemaster Twin Roll

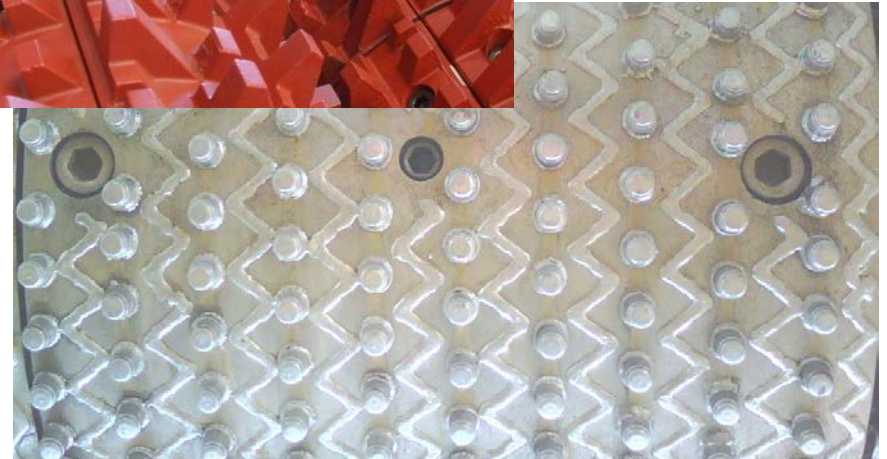
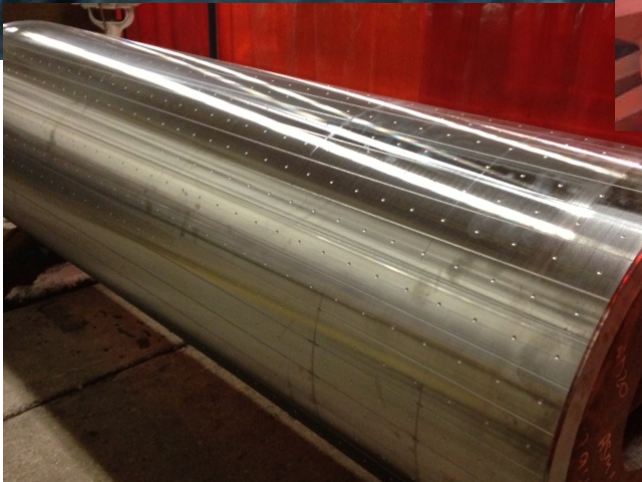
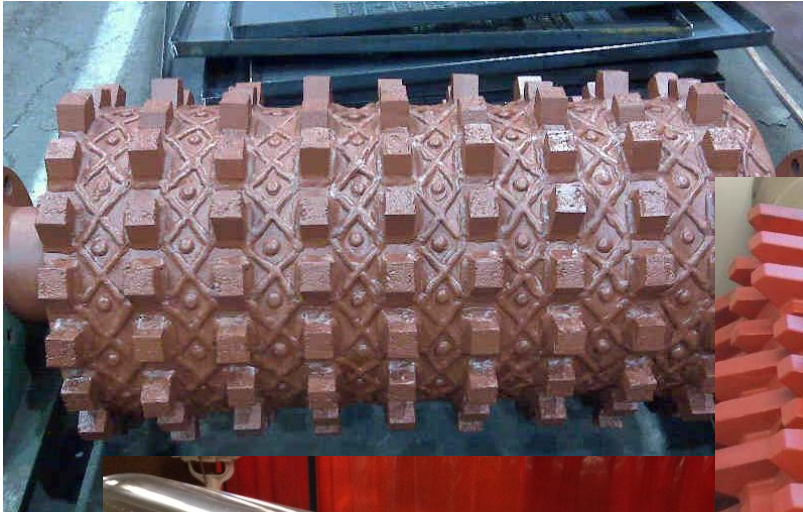
The McLanahan “Shalemaster” was an early rendition of a direct, mechanical drive crusher (Sizer). Introduced in the early 1960’s, this unit was designed for crushing brick and ceramics and has shown to be an outstanding performer on soft shale, kaolin, clay and other sticky materials of low compressive strength.

With its claw tooth design and differential roll speeds this crusher imparts a tearing action on the material and reduces the tendency toward “plugging.”



Tooth Patterns/Metallurgy

McLanahan selects the proper tooth pattern and roll metallurgy for any application.



Rocker Tooth Hammermill Crushers



For reducing friable materials to finer product sizes

Impact Crushers

Primary and Secondary reduction
of various minerals and aggregates

Capacity range from 150 to 3000
TPH

Electric motor, V-belt, Flywheel
driven

Capable of processing recycled
concrete with rebar!

Portable Units Available

New Holland



Andreas



MaxCap



RCP/RCPR



Jaw Crushers

Secondary and Tertiary reduction of various minerals and aggregates

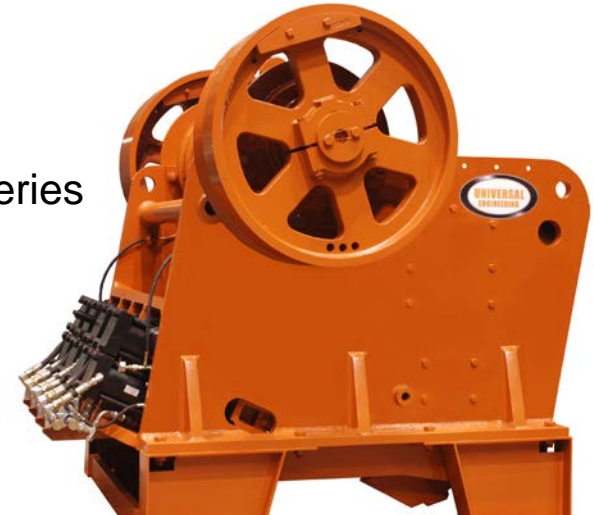
Capacity range from 5 to 2700 TPH

Product Sizes down to 3/4"

Electric motor, V-belt, Flywheel driven

Portable Units Available

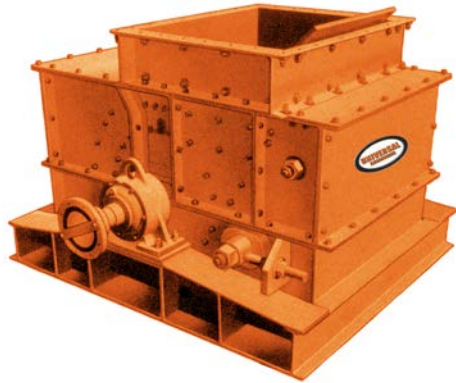
H Series



Standard



Hammermills



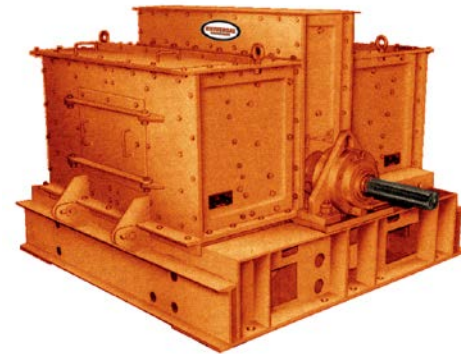
Standard Hammermill

Most Common Configurations

"Application Specific"



Non-Clog Hammermill



Centerfeed Hammermill

Feeder-Breakers

Feeder-Breakers are equipped with a chain and flight drag conveyor and horizontal pick shaft that provides coarse, one-dimensional size reduction of friable materials while feeding a belt or secondary crusher at a specified rate.”

Applications:

Primary reduction of large rom feeds such as coal, lignite, trona, salt, limestone, gypsum, coke and other friable minerals to a conveyable product.

Reduction of frozen lumps of stockpiled material

Feeding a belt conveyor or secondary crusher at an adjustable rate.

Feed sizes up to 1800mm

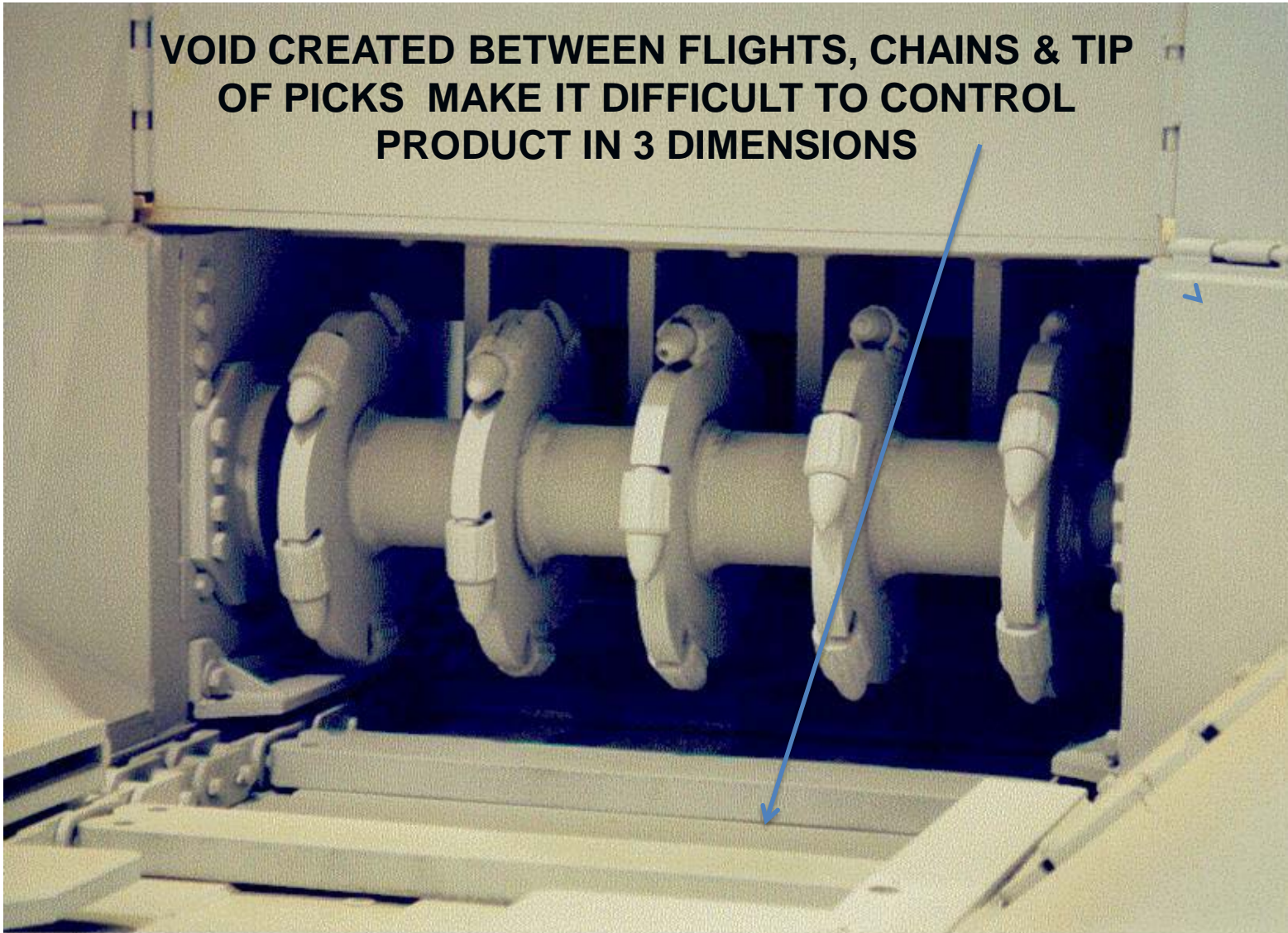
Product sizes of 150mm – 350mm

Fed by shovel, truck, loader or dozer



One Dimensional Sizing

VOID CREATED BETWEEN FLIGHTS, CHAINS & TIP OF PICKS MAKE IT DIFFICULT TO CONTROL PRODUCT IN 3 DIMENSIONS



Loading Configurations



Feeder-Breaker Features

Available in Single....



...and Dual Drag based on feed size and capacity requirements



Also, Crawler Mounted for Underground Mining



Reclaim Feeders

Ground level intake, typically fed by dump truck or bulldozer and ideal for moving material from stockpiles to conveyor belt.



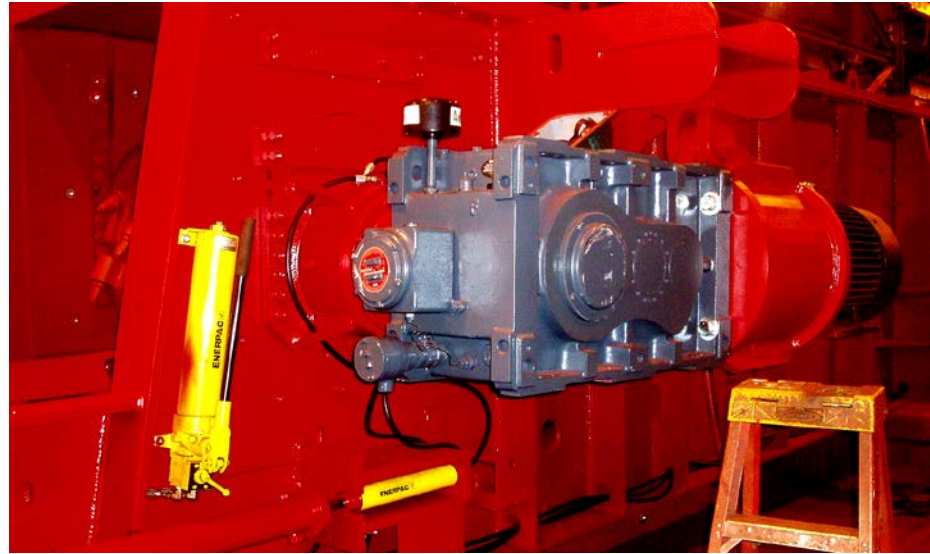
Drag Conveyor

McLanahan Feeders and Feeder-Breakers use engineering class, pin and bushed roller chain and solid steel flight bars. Chain is available in 87.5mm, 112.5mm and 150mm pitch and is selected based on the calculated load.



Drive Configurations

Electro-Mechanical
Breaker Drive



Hydraulic or
Electro-Mechanical
Conveyor Drive



Feeder Drive Options

Hydraulic Drive:

Hydraulic Power Unit



Mechanical Drive:

Option for Variable Frequency Drive (VFD)

Feeder/Conveyor speed:

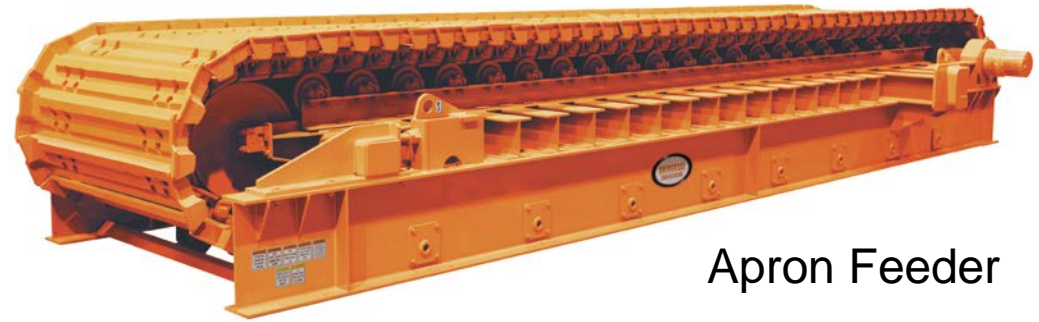
- Selected to meet Through-put Requirement
- Provided as Fixed or Variable



Other Types of Feeders



Drag Chain Feeder



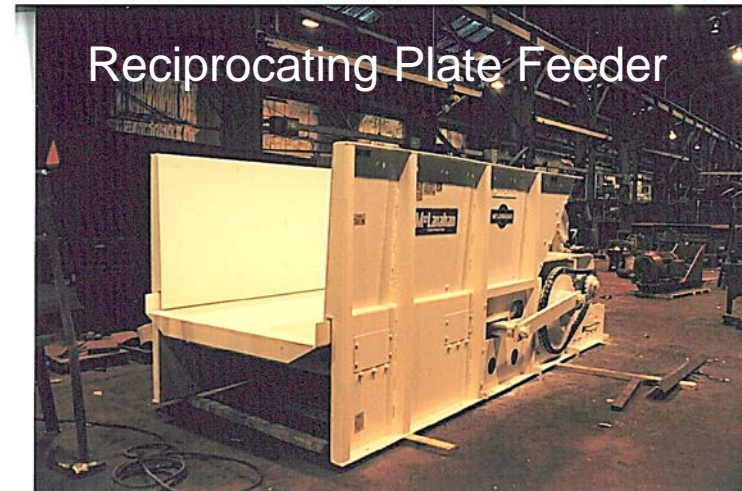
Apron Feeder



Vibrating Pan Feeder



Wobbler Feeder



Reciprocating Plate Feeder

Rotary Breakers – Multiple Stages of Reduction

Commonly Operated in the Coal, Oil Sands and Aluminum Industries...

...the Rotary Breaker is one of the most suitable pieces of equipment for scalping off undesirables and performing size reduction in a single operation.

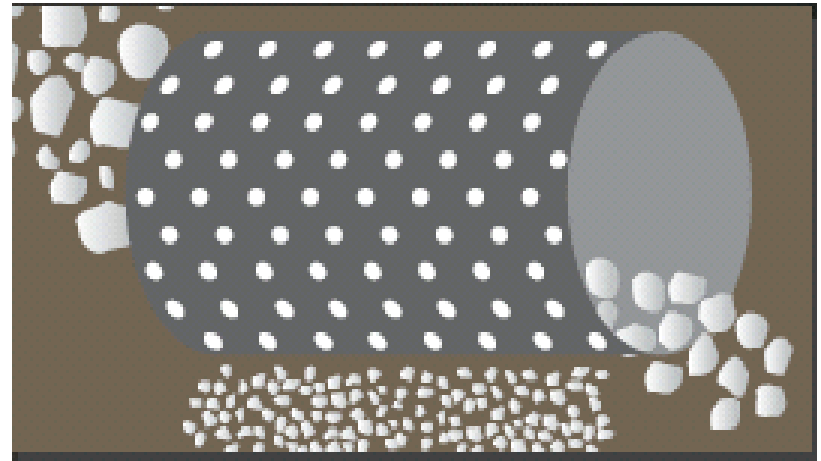
Accepts large feed sizes

Offers wide range of product sizes

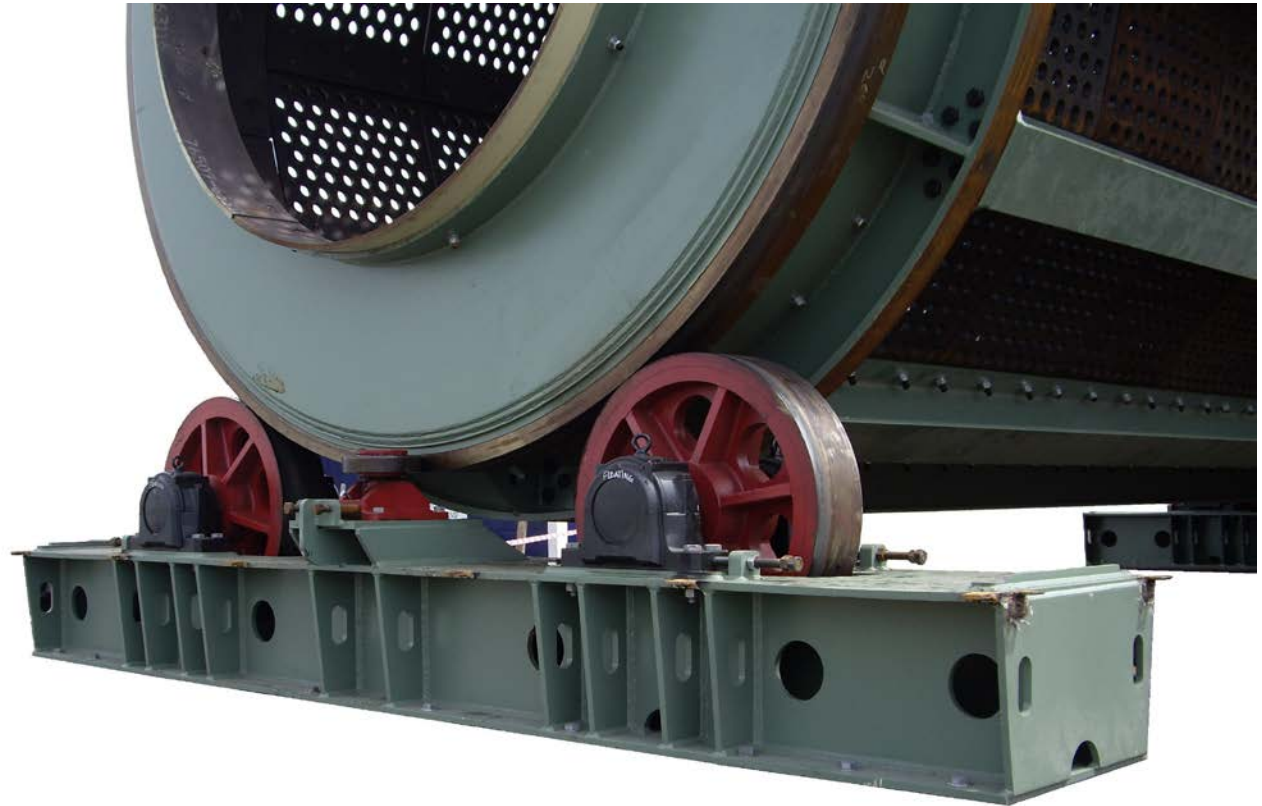
High tonnage output (up to 7,200 MTPH)

Durable, low maintenance design

Economical: low speed (11-15 RPM) = low power consumption



Trunnion Bases



Every Rotary Breaker is machined as a unit to be concentric and is mounted on a set of trunnion bases consisting of trunnion rollers with renewable tires and a thrust roller to insure smooth operation without vibration.

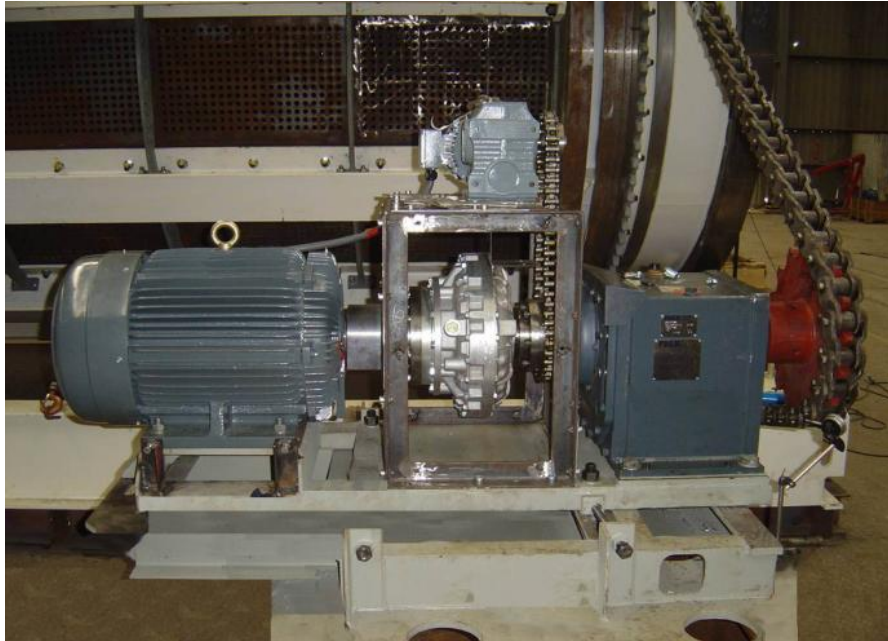
Screen Plates and Lifters

The interior of the Rotary Breaker is lined with overlapping, 25mm thick screen plate with holes based on the size of the desired product.

Lifters are bolted along the cylinder beams at designed intervals and can be set in neutral position (as shown) or to retard or advance the flow of material.

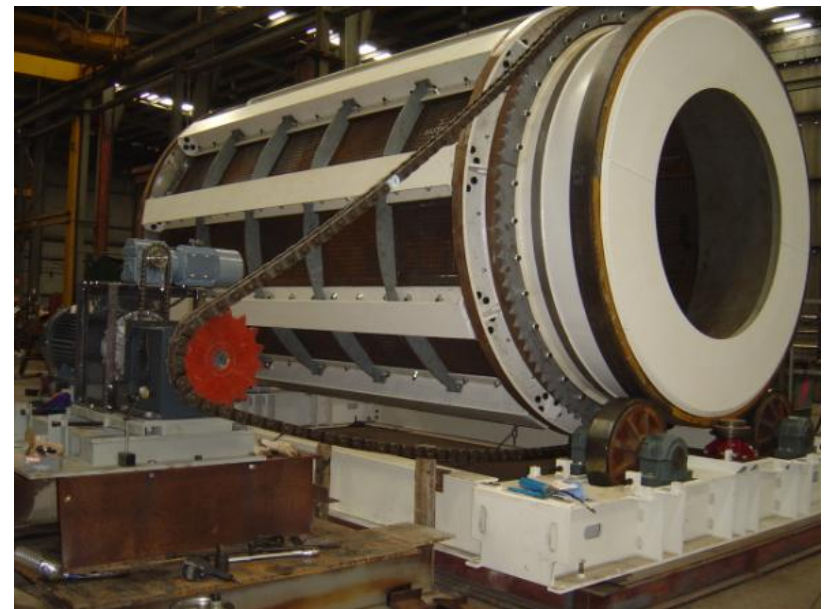


Rotary Breaker Drive



A conventional Breaker Drive uses an Electric Motor/Coupling/Reducer configuration

A large driven sprocket is bolted to the machined circumference of the cylinder feed end while a smaller drive sprocket is mounted to the reducer output shaft. Engineering class roller chain connects the two sprockets.



Filter Presses

Dewaters Thickener Underflow – Eliminates the Need for Settling Ponds



SLURRY IS FED TO THE PRESS VIA HIGH PRESSURE PUMP

WATER IS FILTERED
THROUGH
SCREEN CLOTH



SOLIDS ARE
CAPTURED
FORMING CAKES



Dewatering Screens

Dewatering and Recovering Fines - Typically used in conjunction with Separators



Cyclones and Separators

DE-SLIMING - DEWATERING - FINES RECOVERY - MINE CLEAN-UP



Thickeners Feed to Dewatering Screens

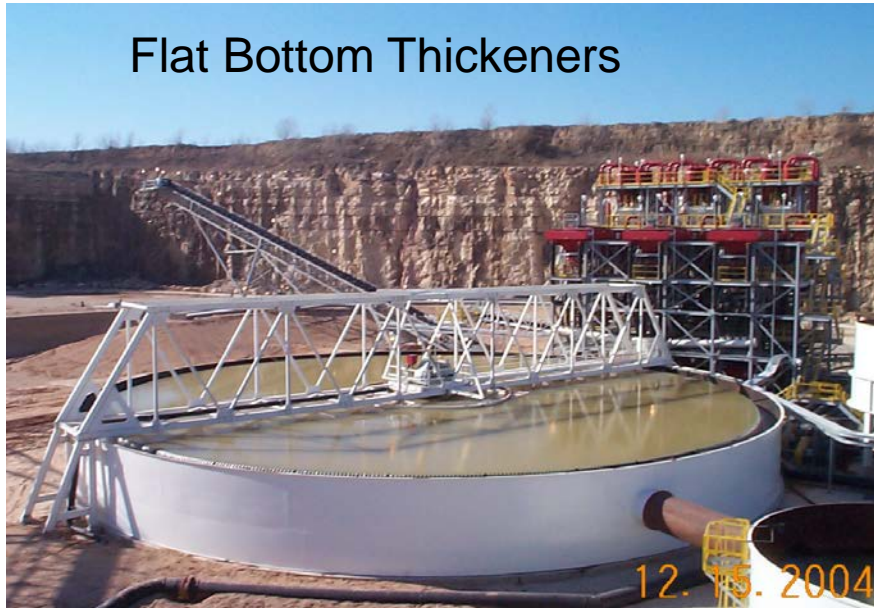
Thickeners

- Process Water Recovery
- Reduction of volume to waste streams
- Heavy Media Recovery

Deep Cone Thickeners



Flat Bottom Thickeners



High Rate Thickeners



Pug Mill Mixers

McLanahan Pug Mill Mixers are ideal for blending a variety of materials for ease of handling or disposal.



Pug Mill Mixers

3 Models: Blendmaster
Coalmaster
Pugmaster

Heavy Duty, Dual Paddle Shaft design

V-Belt or Gear Reducer Drive



Municipal Waste
Sewage Sludge
Shredded Rubber Tires
Industrial Dust
Coal & Fuel Oil
Wood Chips
Lime

PROJECTS

EUROCHEM FERTILIZERS, KAZAKHSTAN

**PHOSPHATE ORE
300MM X 0 FEED
80MM X 0 PRODUCT
200 MTPH CAPACITY**

**McLANAHAN 24 X 48
SUPER QUADROLL
CRUSHER**



ARCH COAL, BLACK THUNDER MINE, GILLETTE, WY

ROM SUB-BITUMINOUS COAL
1500mm X 0 FEED
50mm X 0 PRODUCT
5400 MTPH

McLANAHAN DDF120-40
DUAL DRAG FEEDER

McLANAHAN 36" X 120" MODEL-HC
SUPER TRIPLE ROLL CRUSHER



PCS ALLAN, SASKATOON, SASKATCHEWAN

**ROM POTASH
300m X 100mm FEED
50mm X 0 PRODUCT
1800 MTPH**

**McLANAHAN 36" X 84"
BLACK DIAMOND
DOUBLE ROLL CRUSHER**



HOLCIM CEMENT, LATACUNGA, PERU

PUMICE
300MM X 50MM FEED
50MM X 0 PRODUCT
400 MTPH CAPACITY

McLANAHAN 50 X 18
VIBRATING GRIZZLY
FEEDER WITH HOPPER

McLANAHAN 24 X 48
DDC-SIZER

MOUNTED ON HEAVY
DUTY FRAME WITH
POWERED TRACKS



SOUTHERN COAL, BISHOP PLANT, BISHOP, WV

**COAL – THICKENER UNDERFLOW
30% SOLIDS CONCENTRATE
1.6 SPECIFIC GRAVITY
67.5 MTPH OUTPUT RATE**

**(2) McLANAHAN
2X2X155
RECESSED PLATE
FILTER PRESSES**



SIMPLOT PHOSPHATES, VERNAL, UT

PHOSPHATE

1000mm X 0 FEED

200mm X 0 PRODUCT

1800 MTPH

**McLANAHAN UNIVERSAL
AF72 X 40 APRON FEEDER**

**McLANAHAN 48 X 72
HEAVY DUTY DOUBLE ROLL
CRUSHER**



OAKTOWN FUELS, BLACK PANTHER MINING, OAKTOWN, IN

**DUAL 11' X 20'
McLANAHAN
ROTARY COAL
BREAKERS**

Each reduces ROM Coal to 50mm at 765 MTPH



ENERGY RESOURCES, UHG MONGOLIA



**RAW COAL
1200mm X 0 FEED
60mm X 0 PRODUCT
1200 MTPH**

**McLANAHAN FB36-72-33
FEEDER-BREAKER**

**McLANAHAN 24" X 96"
SECONDARY DDC-SIZER**

BRIDGER COAL, POINT-OF-ROCKS, WY

ROM CRUSHED COAL
100mm X 0 FEED
1620 MTPH

McLANAHAN RF60-46
RECLAIM FEEDER



ARCH COAL, LEER PLANT, GRAFTON, WV

ROM COAL
300mm X 0 FEED
75mm PRODUCT
1620 MTPH

McLANAHAN
30 X 96
SECONDARY
DDC-SIZER



McLANAHAN

McLanahan Mineral Processing Equipment

May 2017

THANK YOU

