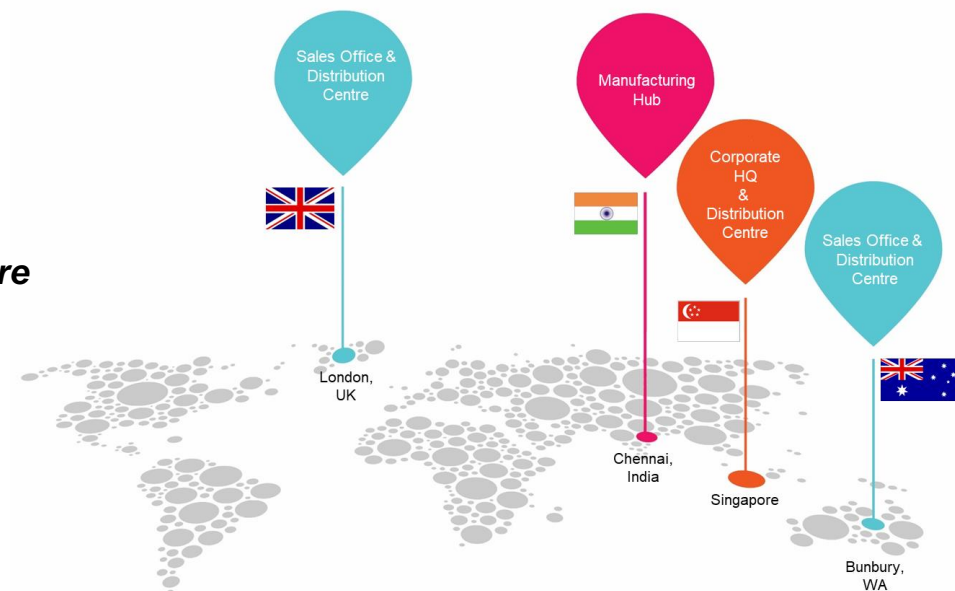
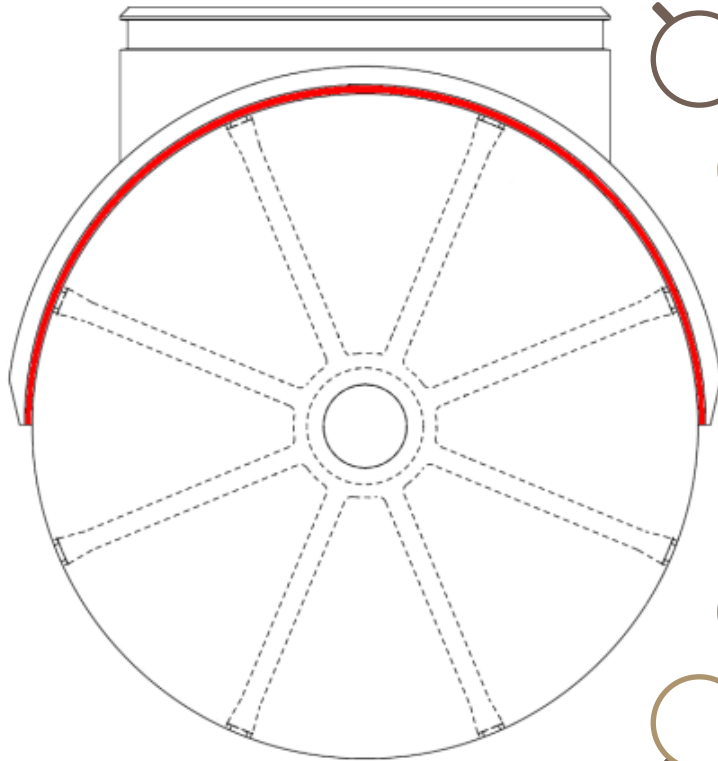


Productivity Enhancement in Feeding & Airlocking using RFS Technology - a study

By
SREEDHAR Sukumaran
General Manager, Anval International Pte Ltd., Singapore



Overview



Feeding & Airlocking using Rotary Valve

Challenges in Handling Abrasives

Causes & Effect of Wear in Valves

Understanding Wear & Applications

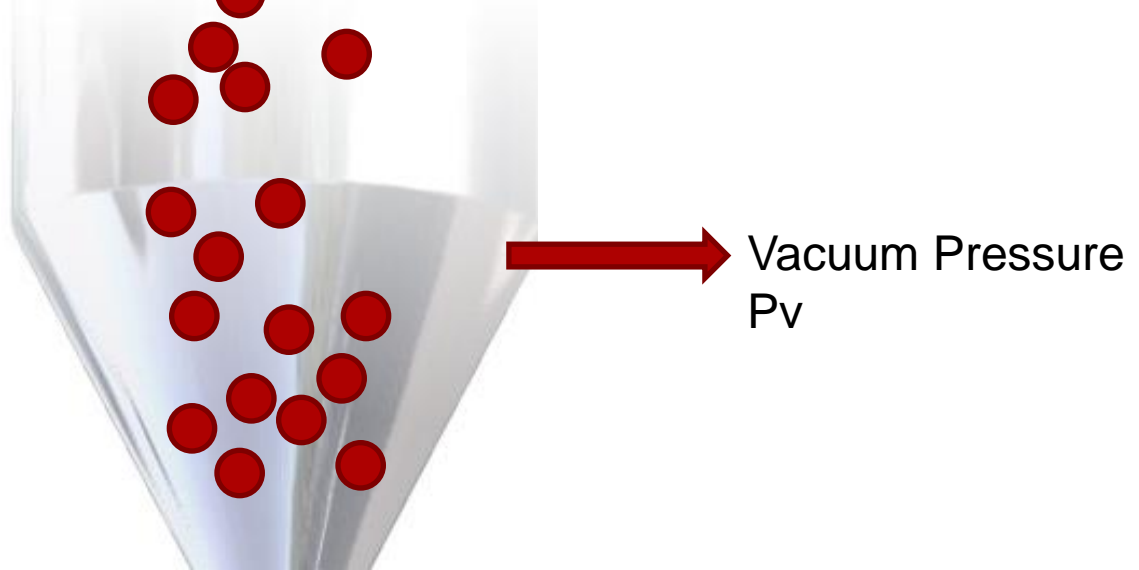
RFS – Working Principle

Wear Study & Result

Labyrinth Sealing & Case Studies

- **Rotary Valves** are used in wide ranges of applications including:
 - **Air locking:** To minimize system air loss while transferring material with differing pressures;
 - **Feeding:** To transfer material between vessels with equivalent pressures;
 - **Metering:** To adjust flow of material frequently;
 - **Isolation:** To isolate vessels and control the flow of material.

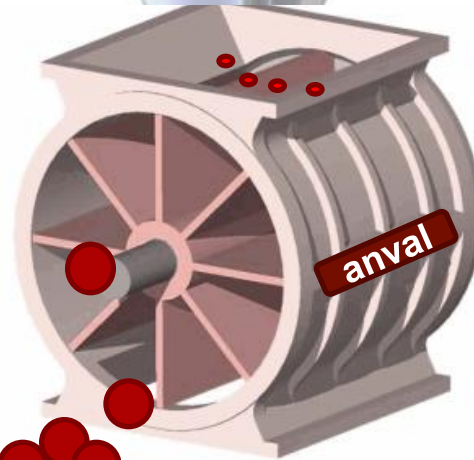
Feeding & Airlocking



● SOLID MATERIAL PARTICLE

● AIR PARTICLE

Rotary Airlock



$$P_a > P_v$$

Atmospheric pressure
 P_a



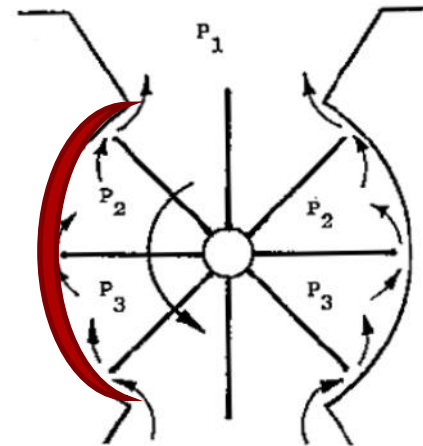
Challenges in Handling Abrasives



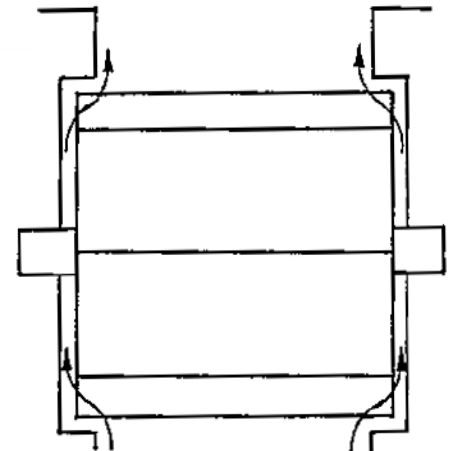
- **Handling Abrasives is the real challenge in Bulk Material Handling;**
- **The situation worsens when High Pressure & High Temp. co-exists;**
- **Conventional Rotary Valves are often destroys itself within few months of operation;**
- **Wear in conjunction with pressure are often underestimated which triggers need for an alternative solution;**
- **Study on Wear Resistances endorses RFS Technology.**

Causes & Effect of Wear in Valves

- Abrasiveness of Material
- Air Leakage
 - Clearance Leakage
 - End Leakage
 - Through Shaft Seal
 - Return Leakage

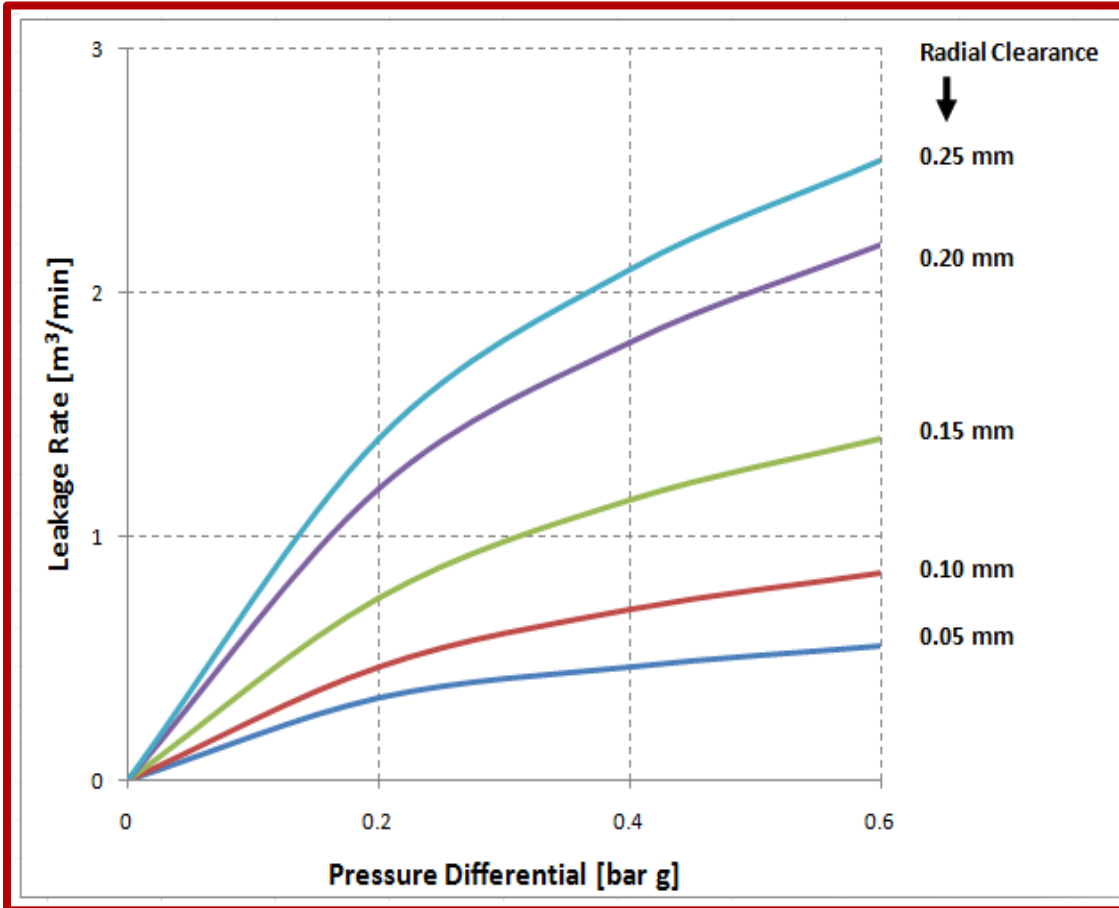


Clearance Leakage



End Leakage

Causes & Effect of Wear in Valves



“One of the main problems with air leakage is that high leakage velocities accelerate the wear of components and increase clearances within the valve, which in-turn causes more air-leakage.”

Causes & Effect of Wear in Valves



- **Environmental Issues**
- **Safety Issues**
- **System Stoppage**
- **Low Productivity**
- **Short Life of Equipment**
- **High OPEX**
- **Low Performance**



Leakage thru' Shaft!

System Stoppage!

Flushing!

Frequent Replacements!

Frequent Tip Adjustments!

Environmental Issues!

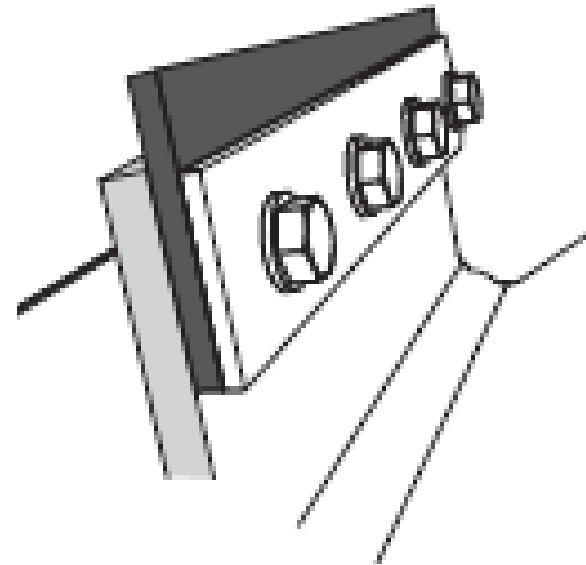
Wear & Tear!

Sleepless Nights!



Eureka ! I got it !!

“Use Adjustable Tips in Rotors and/or Coat Chromium in the Bore!!”

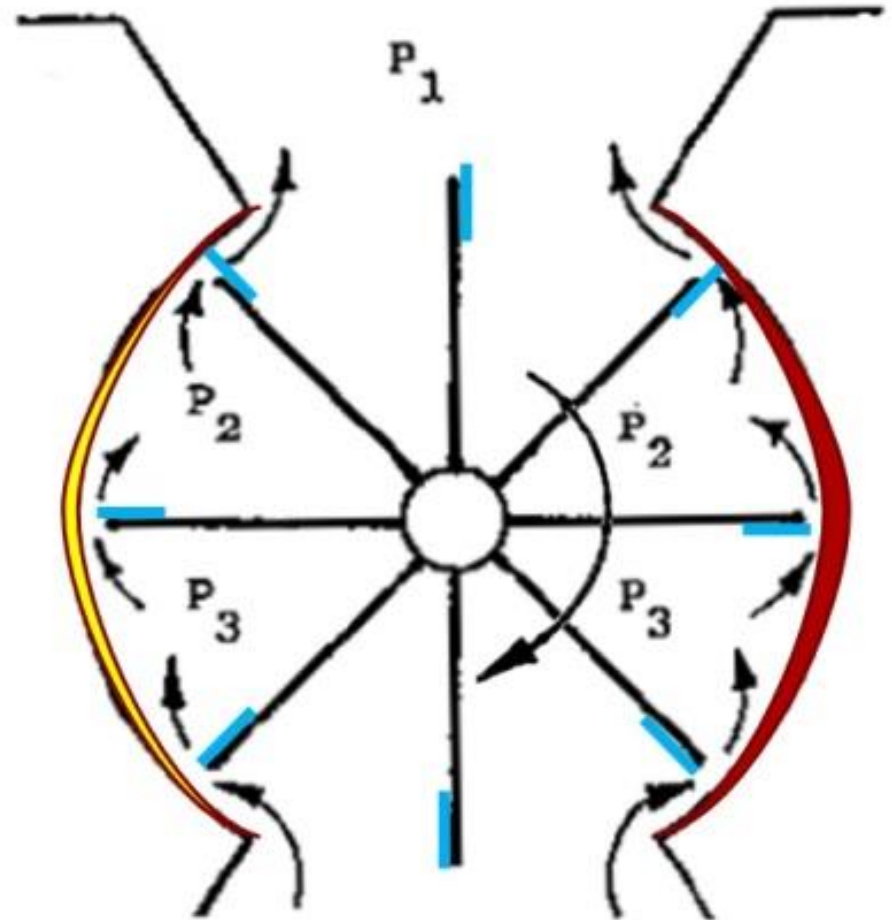


resulting to...

the same **issues!!**

Due to

- Improper adjustments
- Hard to rotate/adjust all tips evenly
- Frequent Line Stoppage
- Valve bore becomes OVAL
- Thus Flushing !
- High Air Leakage !!
- EXPONENTIAL Wear !!!



...and eventually, the valve **destroy** itself!

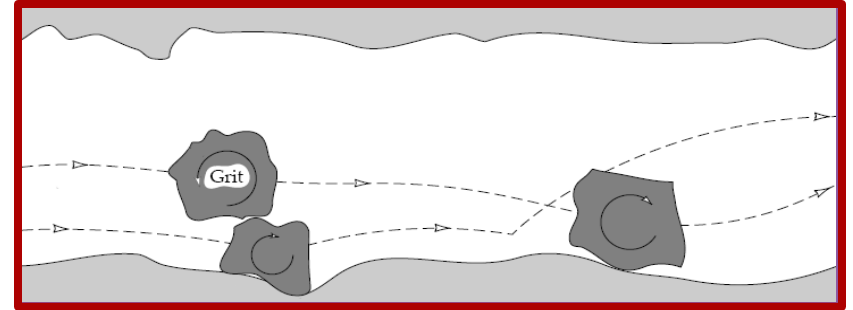


Understanding Wear & Applications

➤ **Wear**

➤ **Abrasion**

➤ **Erosion**



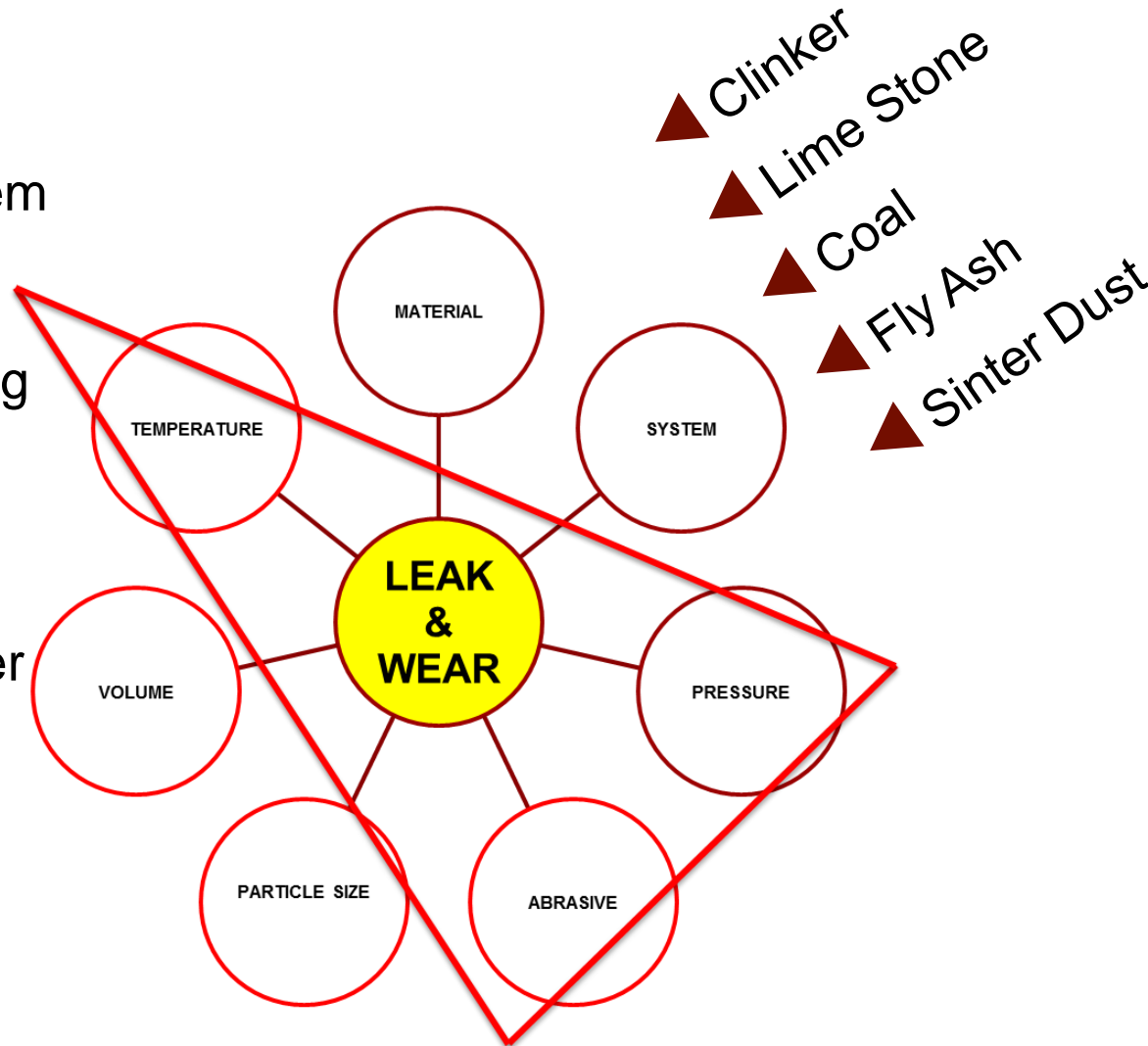
Abrasive wear caused by sliding contact of abrasive particles



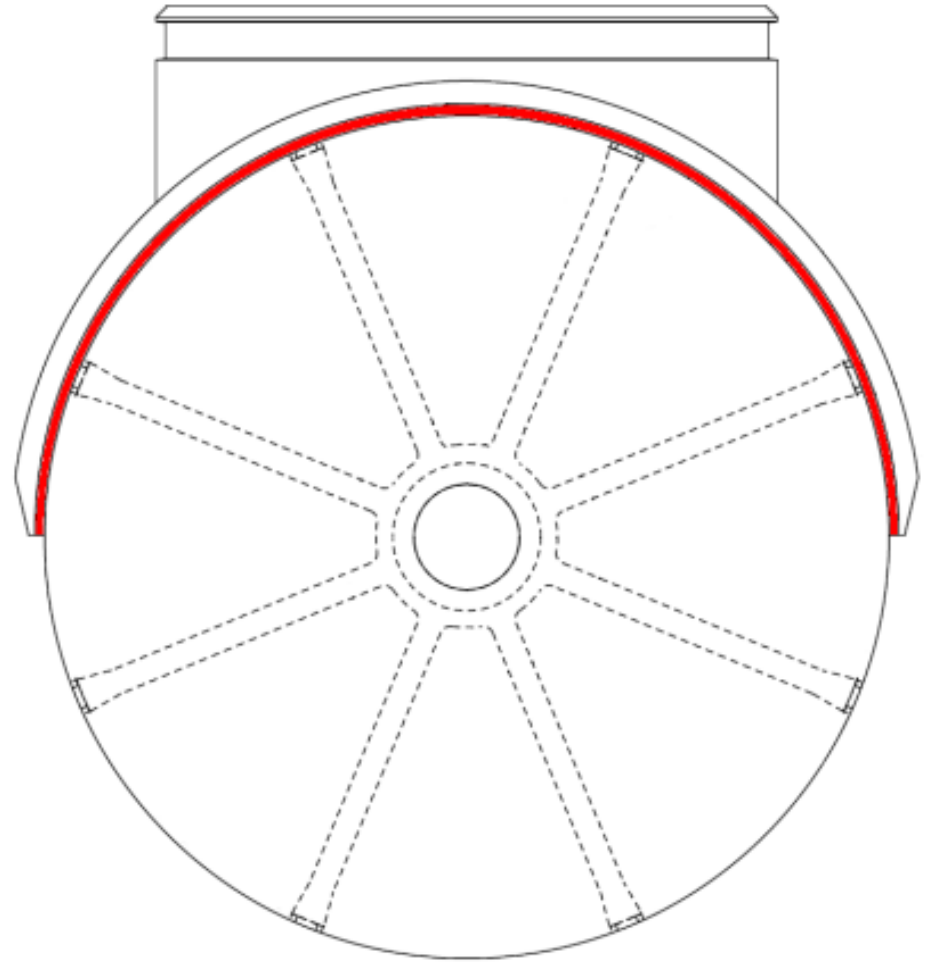
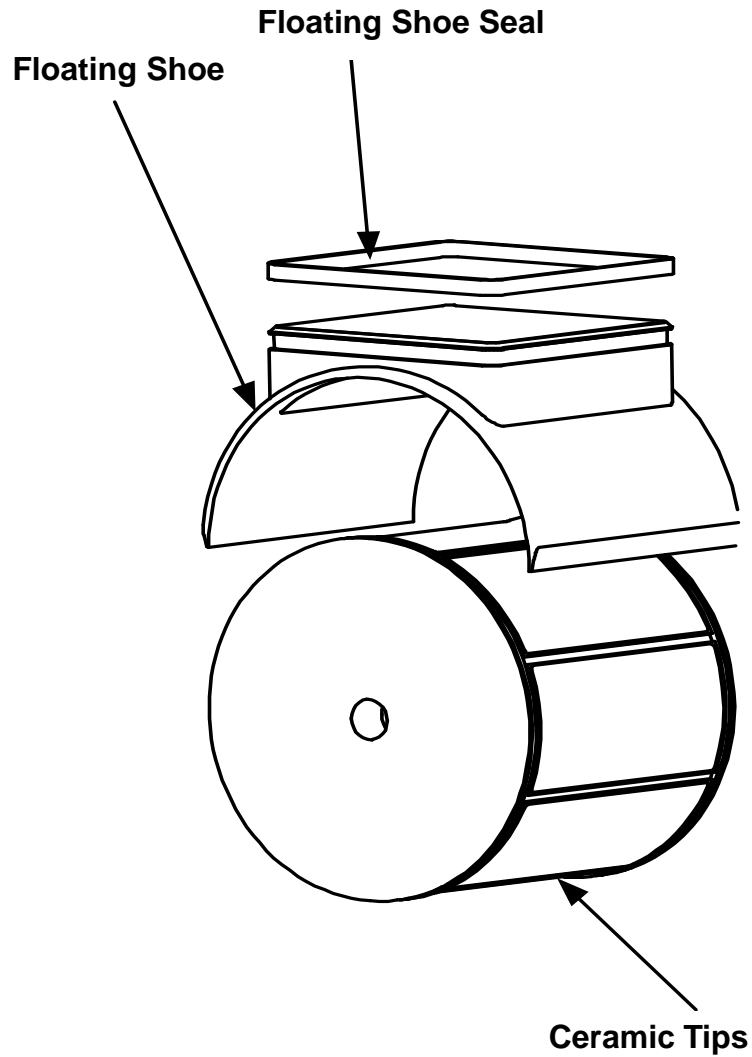
Erosive wear caused by impact of particles

Understanding Wear & Applications

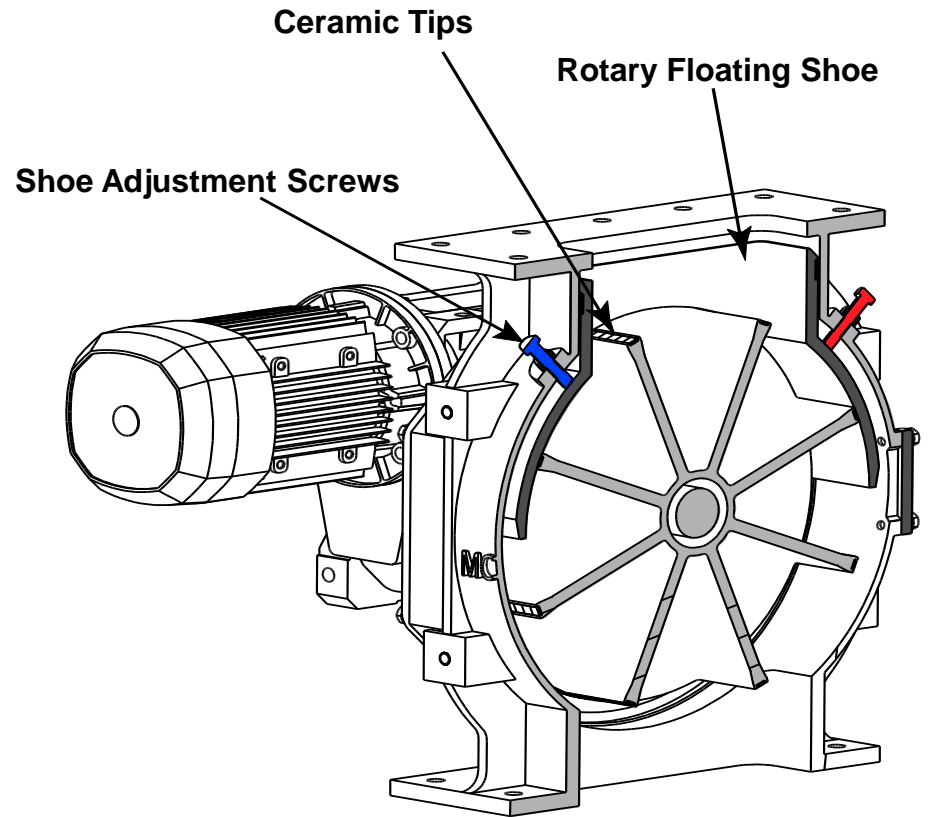
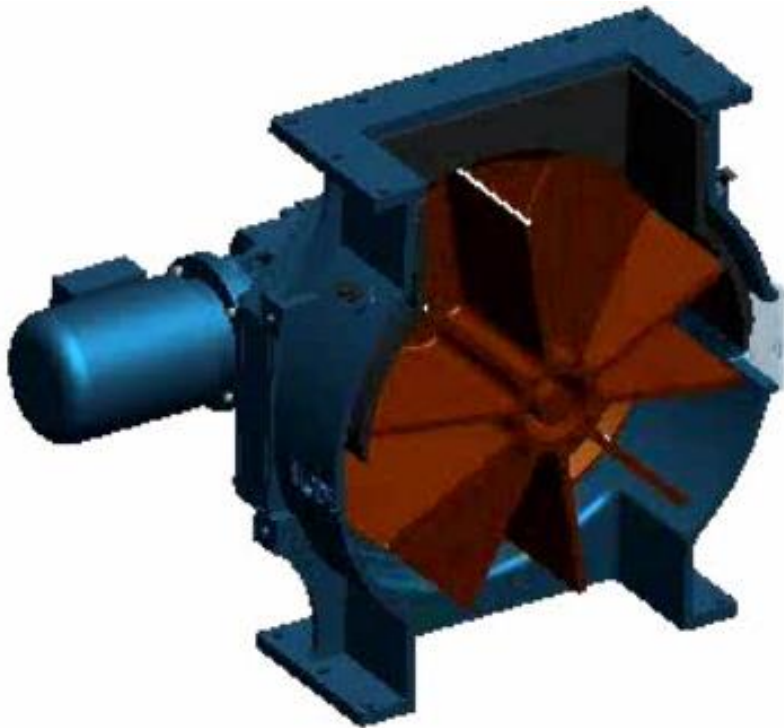
- ▶ Pulverized Coal Firing
- ▶ Cooler Under Grate System
- ▶ Weigh Feeding System
- ▶ FRW Rotor Weigh Feeding
- ▶ Loss in Weigh Feeding
- ▶ Fly Ash collection in MDC
- ▶ AQC Heat Recovery Boiler
- ▶ Solid Flow Metering
- ▶ Feeding to FK Pump



RFS – Working Principle

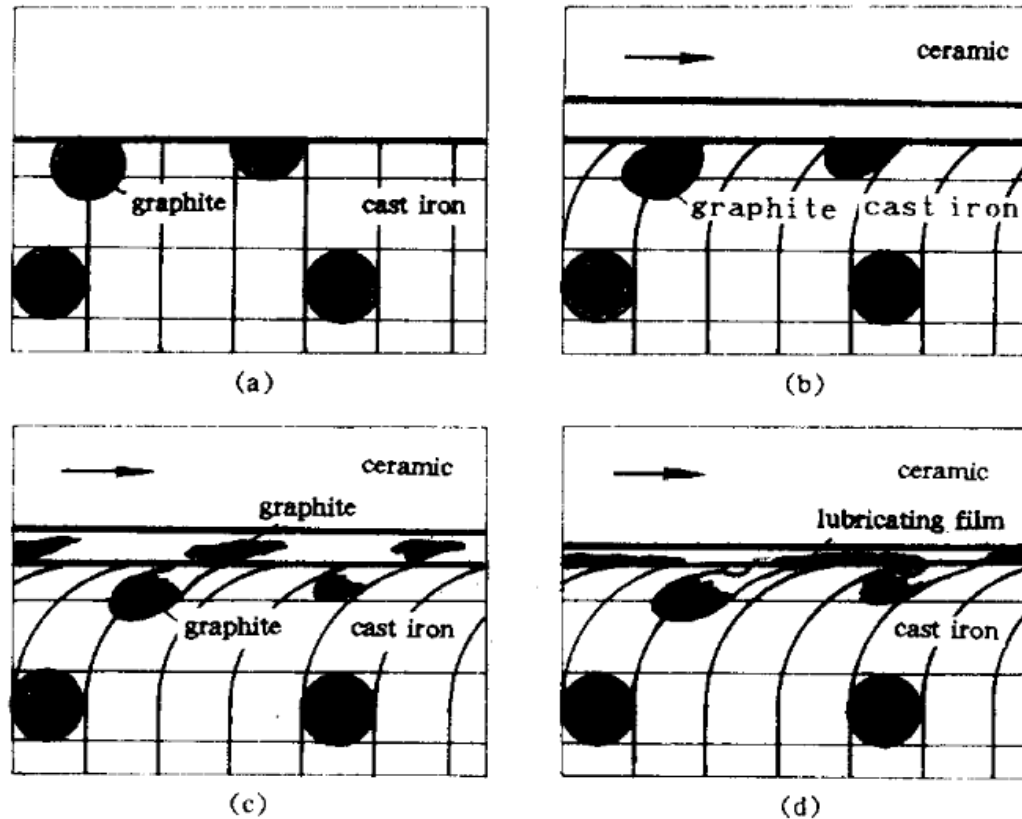


RFS – Working Principle



Rotary Floating Shoe – Cross Sections

RFS – Working Principle

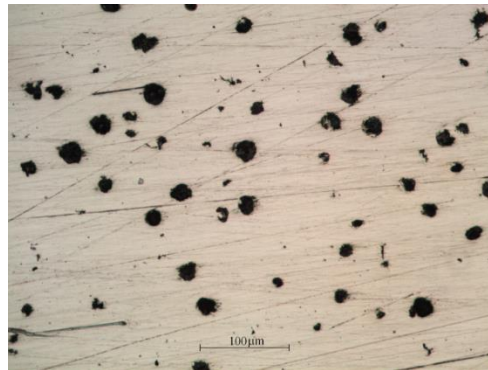


The formation of LUBRICATING GRAPHITE layer during sliding Contact between Spheroidal Graphite Cast Iron Iron and Ceramic Alumina.

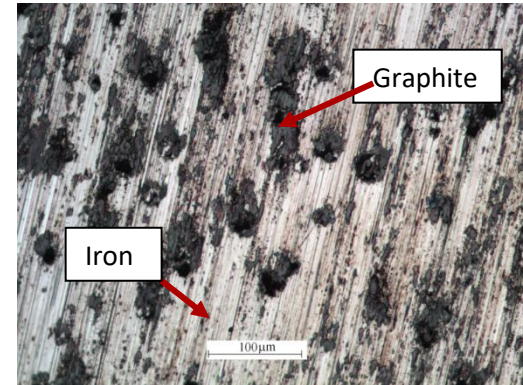
Wear Study Result

SG IRON

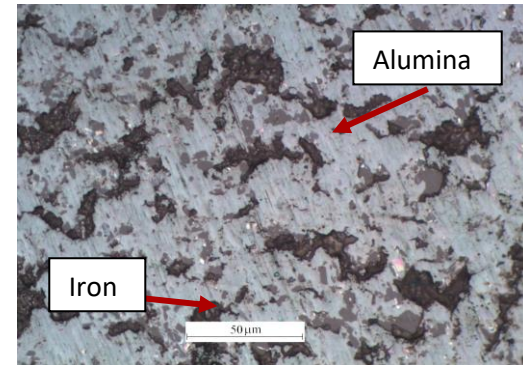
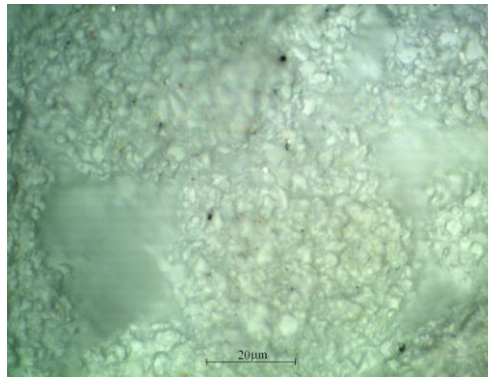
SURFACE BEFORE WEAR TEST



SURFACE AFTER WEAR TEST



CERAMIC ALUMINA



Wear Study Result



“The RFS can be used to transport even the most aggressive product and still have a lifecycle of years instead of months”

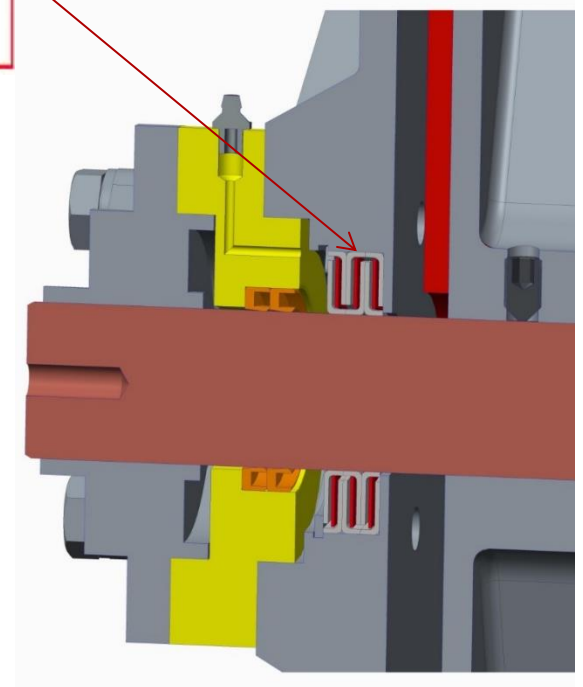


THE UNIVERSITY OF
**WESTERN
AUSTRALIA**

Labyrinth Sealing



- ‘Labyrinth Sealing’ System;
- “Zig Zag” arrangement by design;
- Passage of particles through a variety of chambers by centrifugal motion is controlled



SHAFT ARRANGEMENT

Case Studies



For 100% Sealing

For Longer Service

For High Pressure Applications

For Combating Wear & Tear

For Minimal Maintenance

For High Temperature Applications

Case Studies

University Tests Prove Durability of Anval Valves

THE SCHOOL OF MECHANICAL ENGINEERING AT THE UNIVERSITY OF WESTERN AUSTRALIA CONFIRMS ANVAL'S ROTARY VALVE CAPABILITY

The new tests were conducted over a period of 12 weeks at the University of Western Australia's School of Mechanical Engineering. The Anval rotary valve was subjected to a range of conditions of use, including high pressure, high temperature, and high speed rotation. The results of the tests confirmed the valve's ability to handle these conditions with ease and reliability.

Hope Downs Iron Ore Plant Confirms Anval Heavy Duty Rotary Valve Operation

In 2008 Anval's rotary valve was installed at the Hope Downs Iron Ore Plant. The valve has since confirmed its reliability and performance in a heavy-duty environment. The plant's operations have shown that the valve is capable of handling large volumes of material under high pressure and temperature.

REDUCED PLANT DOWNTIME THROUGH ANVAL'S ENGINEERING AND OUTSTANDING MAJOR PLANT EXPANSION

Global silicon producer Sinco has installed Anval rotary valves at its plant in Western Australia. The valves have helped reduce plant downtime during a major expansion project. The valves' reliability and performance have been a key factor in the plant's success.

Anval Wins Major Expansion Contract

Anval has been awarded a major expansion contract for the installation of rotary valves at a large industrial facility. The contract involves the supply and installation of several Anval rotary valves to handle high-volume material flow.

Anval Increases Efficiency and Reduces Total Cost of Ownership

Anval rotary valves are designed for efficiency and reliability, which helps reduce the total cost of ownership for industrial facilities. The valves' long service life and low maintenance requirements make them a cost-effective solution for material handling.

Anval Confirms the Dexterity of its Rotary Valve

Anval rotary valves are known for their dexterity and ability to handle a wide range of materials. The valves' design allows them to operate in a variety of environments, from high-temperature applications to light-duty material handling.

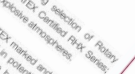
ANVAL VALVES PROVIDE OPERATIONAL ISSUES AT SIMPLE AND ROBUST DESIGN

Anval rotary valves are designed for simplicity and robustness, making them easy to operate and maintain. The valves' straightforward design and reliable performance make them a popular choice for industrial applications.

ANVAL'S HIGHLY DURABLE FURTHER DEMONSTRATE APPLICATION IN BRIGHT

Anval rotary valves are used in a wide range of applications, including in the mining and metallurgical industries. The valves' durability and performance have been demonstrated in numerous high-pressure and high-temperature environments.

THE ATEX CERTIFIED ANVAL RHX SERIES ROTARY VALVE IS DESIGNED FOR USE IN A WIDE RANGE OF APPLICATIONS FROM HEAVY MINERAL LUMPS TO LIGHT FLOUR DUST WHERE THERE IS A POTENTIALLY EXPLOSIVE ATMOSPHERE



The valves were installed at a large operation, each valve allowed the valves to compact down per level and trip sooner.

The Anval RHX Series valves are manufactured to robust design standards and an extensive Quality Management System that ensures the valve is operated in accordance with the manufacturer's instructions.

The RHX Series valves are ATEX certified and designed for use in potentially explosive atmospheres. The valves' design and construction meet the requirements of the ATEX Directive.

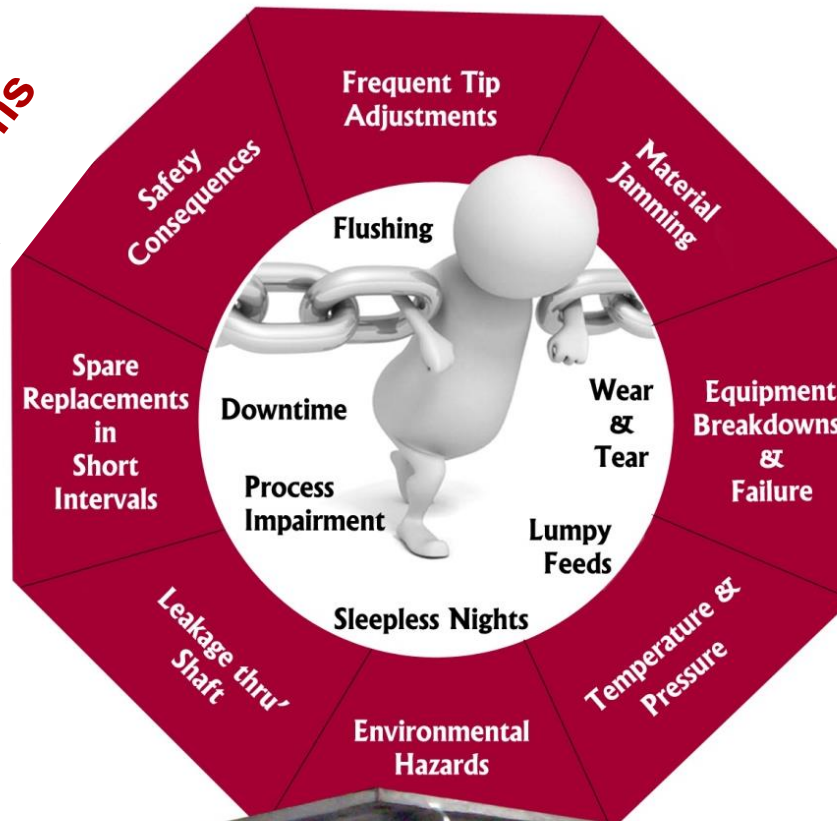
The RHX Series can be used in Safety zones 20 (flour dust) and 21 (general) in explosion areas such as steel, cement, power plants, metal processing, chemicals, flour mills and other areas where a potentially explosive atmosphere may be present.

PRODUCT HIGHLIGHTS:

- ATEX certified with protection by Construction Safety
- Heavy duty single piece cast iron body
- Available in Direct / Chair / Bare Shaft options
- Equipped with "Safety Seal" for improved sealing
- Available with Gate or Gears during
- Excellent Abrack performance during
- Minimal maintenance requirements

anval
 111/120 C T 125 °C
 CE 0075 Ex

The RFS Valves...
Solution to UNRESOLVED Problems
in Cement Applications...



Q & A

So, why keep
plugging the dike?

*to experience the RFS valve,
visit us @ stall A-13*

THANK YOU

write to: info@anval.net

www.anval.net



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