

# Force Vector. Inc.

*North American Distributors for:*

**Cardox International LTD.**

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"We are the original  
manufacturers of Cardox Products"

**CARDOX INTERNATIONAL LTD**

**CARDOX SYSTEM**

**BLOCKAGE CLEARING SYSTEM  
HIGH PRESSURE BREAKING  
SYSTEM FOR THE CEMENT  
MAKING INDUSTRY**

# CARDOX APPLICATIONS

## PREHEATER - Holcim Davao



**BEFORE**



**DURING**



**AFTER**

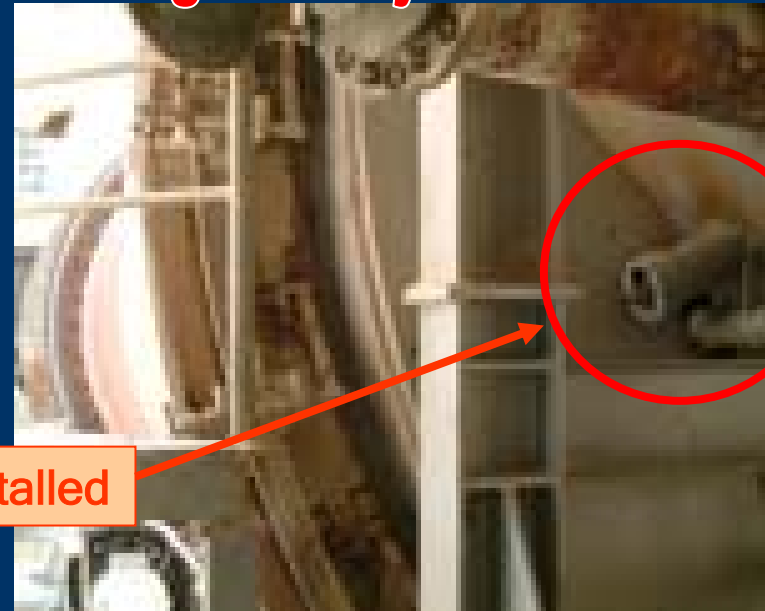
# CARDOX APPLICATIONS

## INLET CHAMBER

Pictures show Cardox Sockets installed onto both sides of the Inlet Chamber



## Lafarge Trobje Slovenia



Sockets Installed

# CARDOX APPLICATIONS

## INLET CHAMBER

### Sockets Installed

Right, Cardox Sockets installed onto Inlet Chamber. A total of Six Sockets were installed on the Chamber. (Three Sockets on lower section and three 1.5m above).



## UAE - Ras Al Kaimah

To accommodate Sockets, holes are cut in Inlet Chamber with oxy- acetylene torch, then holes are drilled through refractory lining with diamond core drill.



# CARDOX APPLICATIONS

## CYCLONES



**Blue Circle Australia**



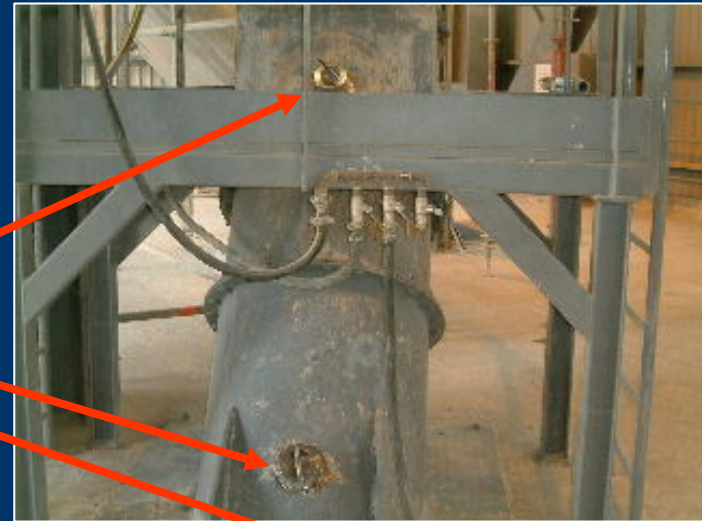
**Heidelberg - Castle Cement - UK**

**CARDOX SOCKETS &  
PLUGS WELDED ONTO  
CYCLONES**

# CARDOX APPLICATIONS

## FEED PIPES

CARDOX SOCKETS



**Buxton Cement, U.K.**

**Irish Cement, Ireland**

# CARDOX APPLICATIONS

## COOLER AREA

(Cemex Plant, Philippines)



CARDOX SOCKETS FOR CLEARING OF "SNOWMAN" BUILD UP

### SNOWMAN & CLINKER BALL CLEARING





# CARDOX APPLICATIONS

## ROTARY KILN (AA PULP MILL - Thailand)



**RING FORMATION BUILD-UP CLEARED IN MINUTES.  
CARDOX IS RECOMMENDED BY KILN MANUFACTURERS.**

# CARDOX APPLICATIONS

## ROTARY KILN (Afyon Cement, Turkey)

- IN THE **ROTARY KILNS**, BUILD-UP USUALLY OCCURS IN ONE PARTICULAR SECTION (4 TO 5 M) ALONG THE LENGTH OF THE KILN.
- SOCKETS ARE USUALLY PLACED AT SPACINGS OF 0.75 M - 1 M AND 2 OR 3 ROWS AROUND THE CIRCUMFERENCE DEPENDING ON THE KILN DIAMETER (PICTURE 1 & 2).
- CARDOX TUBE READY TO BE ACTIVATED (PICTURE 3)

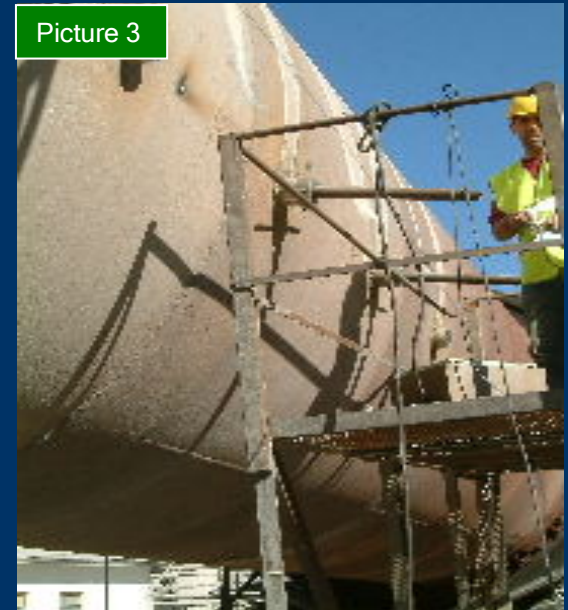
Picture 1



Picture 2



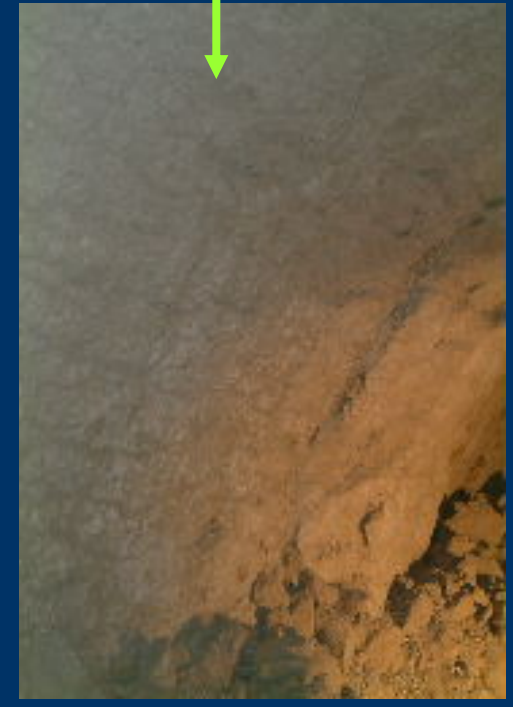
Picture 3



# CARDOX APPLICATIONS

## ROTARY KILN (Afyon Cement, Turkey)

FROM THIS TO.....THIS IN LESS THAN 1 HOUR  
VIEW OF ROTARY KILN FROM INSIDE.



# CARDOX APPLICATIONS

## RAW FEED MILL



CARDOX  
SOCKETS

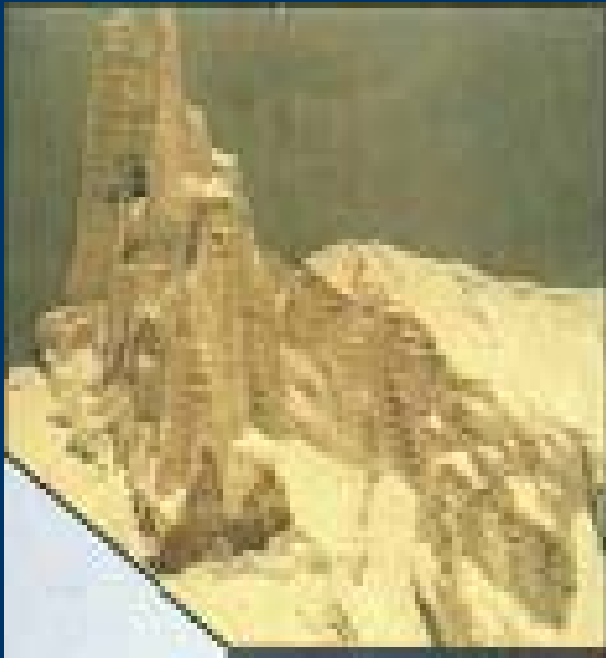


PT Semen Gresik, Indonesia

# CARDOX APPLICATIONS

## SILOS

CARDOX TUBE IS ACTIVATED, RELEASING WITHIN A SECOND A POWERFUL HEAVING MASS OF COLD CO<sub>2</sub> THAT EXPANDS 600 TIMES ITS ORIGINAL VOLUME



**BEFORE**

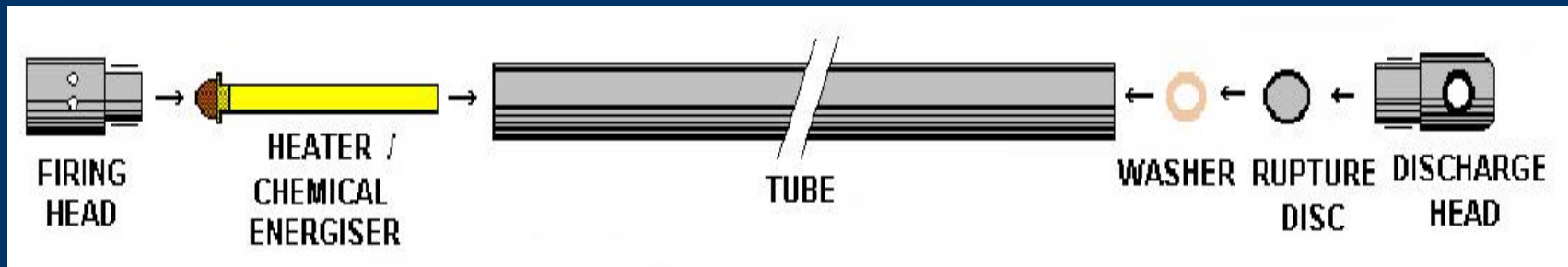


**AFTER**

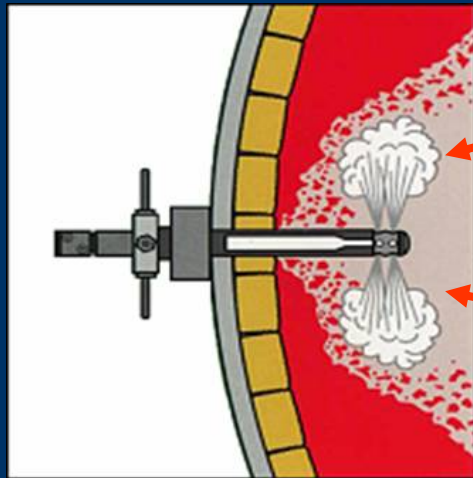
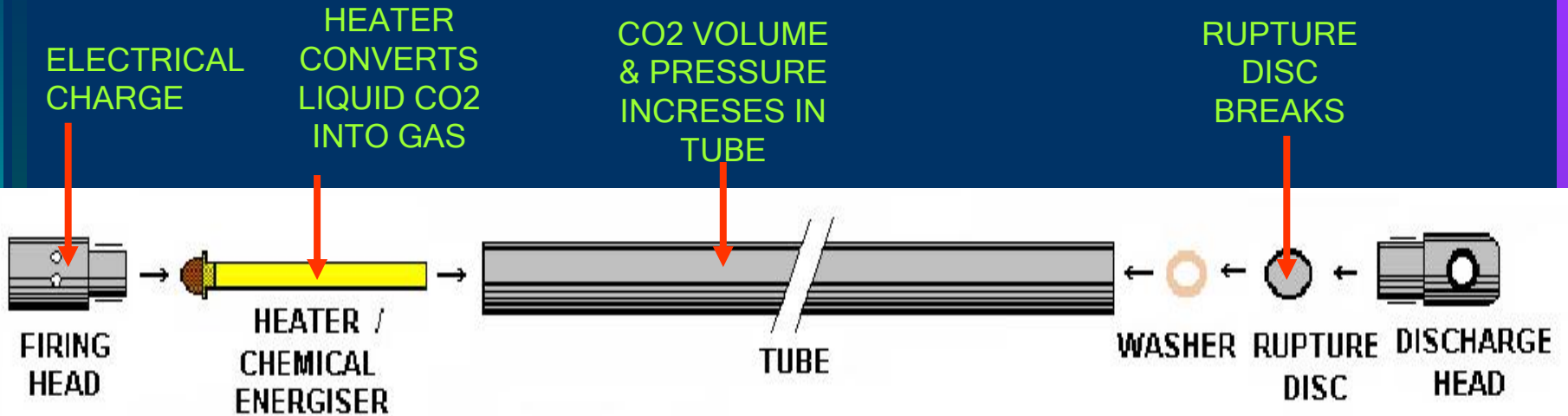
**Lafarge - Alexandria Cement, Egypt**

# CARDOX TUBE PARTS

CARDOX CONSISTS IN A HIGH STRENGTH REUSABLE  
STEEL TUBE FILLED WITH LIQUID CO<sub>2</sub>, A CHEMICAL  
HEATER AND A RUPTURE DISC



# CARDOX TUBE PARTS



CO2 RELEASES AT 600 TIMES ITS ORIGINAL VOLUME

CREATES A POWERFUL HEAVING FORCE AT 27,000PSI OR 1900 BAR

**CARDOX CAN DISLODGE OVER 3 TONS OF BUILD-UP IN MILLISECONDS**

# CARDOX FIXTURES

## CARDOX SOCKETS AND PLUGS

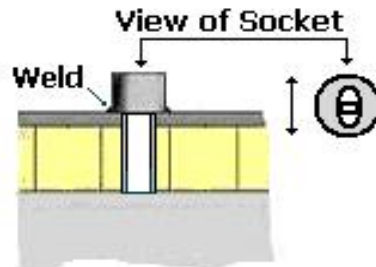
### INSTALLING CARDOX TUBE SOCKETS

1. Make hole in steel kiln shell Dia 80mm and in refractory lining Dia 75mm

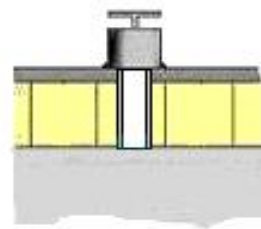
Side Elevation



2. Locate Tube Socket and stainless steel extension Tube in hole and weld into position



3. Insert Plug in Socket until Cardox is needed to clear build-up



Socket  
with SS  
Extension  
Pipe



Standard  
Socket  
with  
Plug



# DRILLING INTO BUILD-UP TO ACCOMMODATE CARDOX TUBES

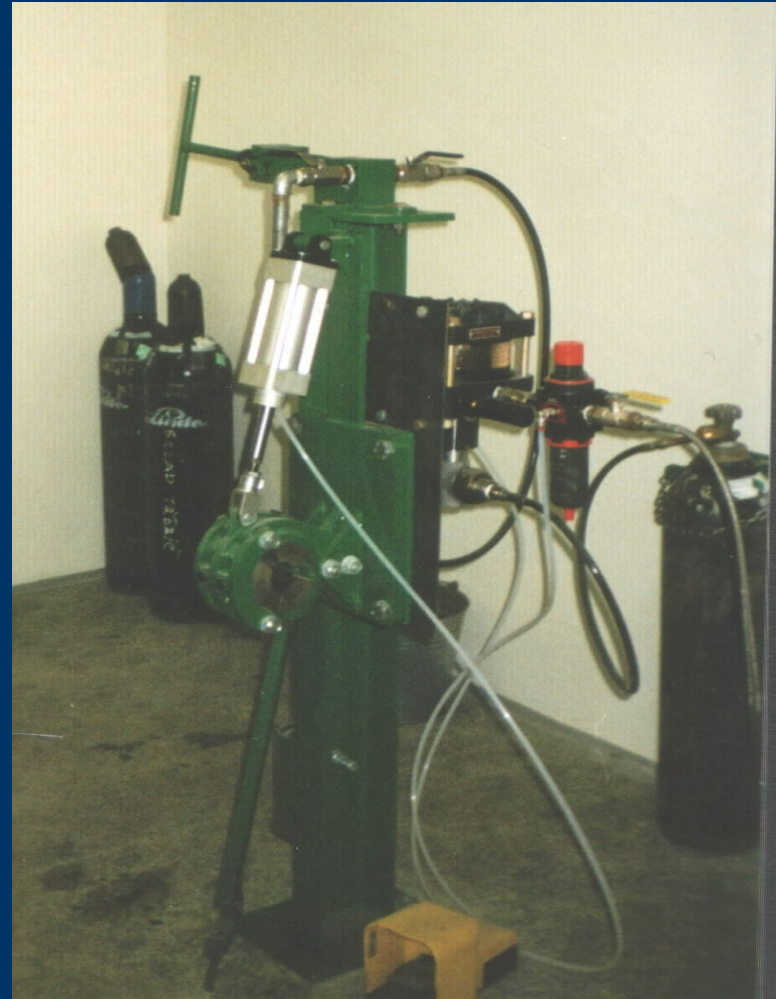
WITH THE CARDOX DRILLING EQUIPMENT, IT TAKES JUST A  
FEW SECONDS TO DRILL A HOLE IN THE BUILD UP TO  
ACCOMMODATE A CARDOX TUBE



# CARDOX TUBE RECHARGING UNIT

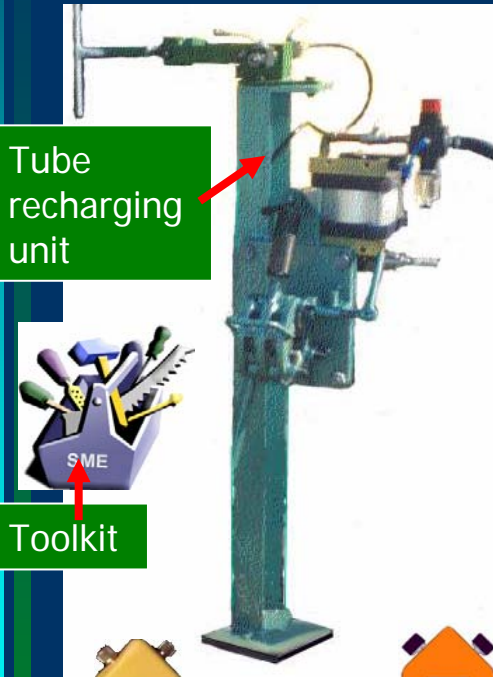
## THE VERSATILE CARDOX RECHARGING UNIT .....

- ✓ CAN BE LOCATED ANYWHERE ON PLANT.
- ✓ TAKES LESS THAN 1 MINUTE TO FILL CARDOX TUBES.
- ✓ ONLY NEEDS TO BE USED WHEN A BLOCKAGE / BUILD-UP OCCURS.
- ✓ NEEDS MINIMUM AMOUNT OF MAINTENANCE



# WHAT'S IN THE BOX?

## ONE-TIME PURCHASE



Tube recharging unit



Toolkit



Ohmmeter with leads & cables



Igniter with leads



Firing head  
(5 units)



Discharge head  
(5 units)



Digital scale



Socket with SS  
Extension Pipe  
(10 units)



Standard Socket  
with Plug  
(10 units)



Cardox drilling equipment  
for drilling into build up to  
accommodate the tube

## CONSUMABLES (sets)

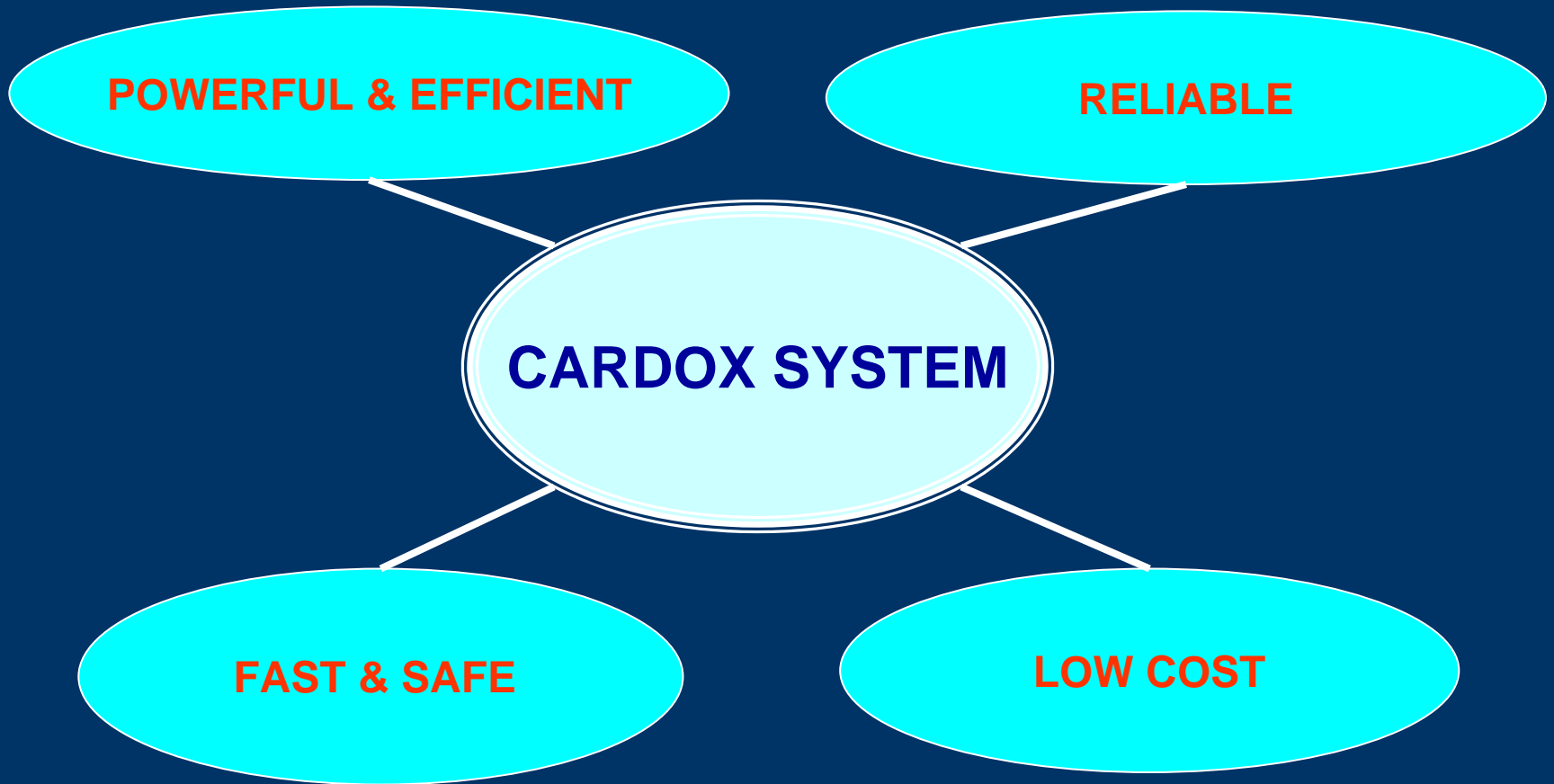


Rupture  
disc &  
washer



Heater /  
Chemical  
energizer

# *WHY CARDOX ?*



# CARDOX ... POWERFUL & EFFICIENT

- **CARDOX = 100% efficiency**
  - Shear Disc rupture guarantees designed pressure.
- **AIR SHOCKS (air blasters)**
  - Lower pressure than CARDOX
  - ineffective when build-ups are more substantial
  - often lose efficiency sometimes just days after a maintenance work.



HEIDELBERG CEMENT - CZECH REPUBLIC

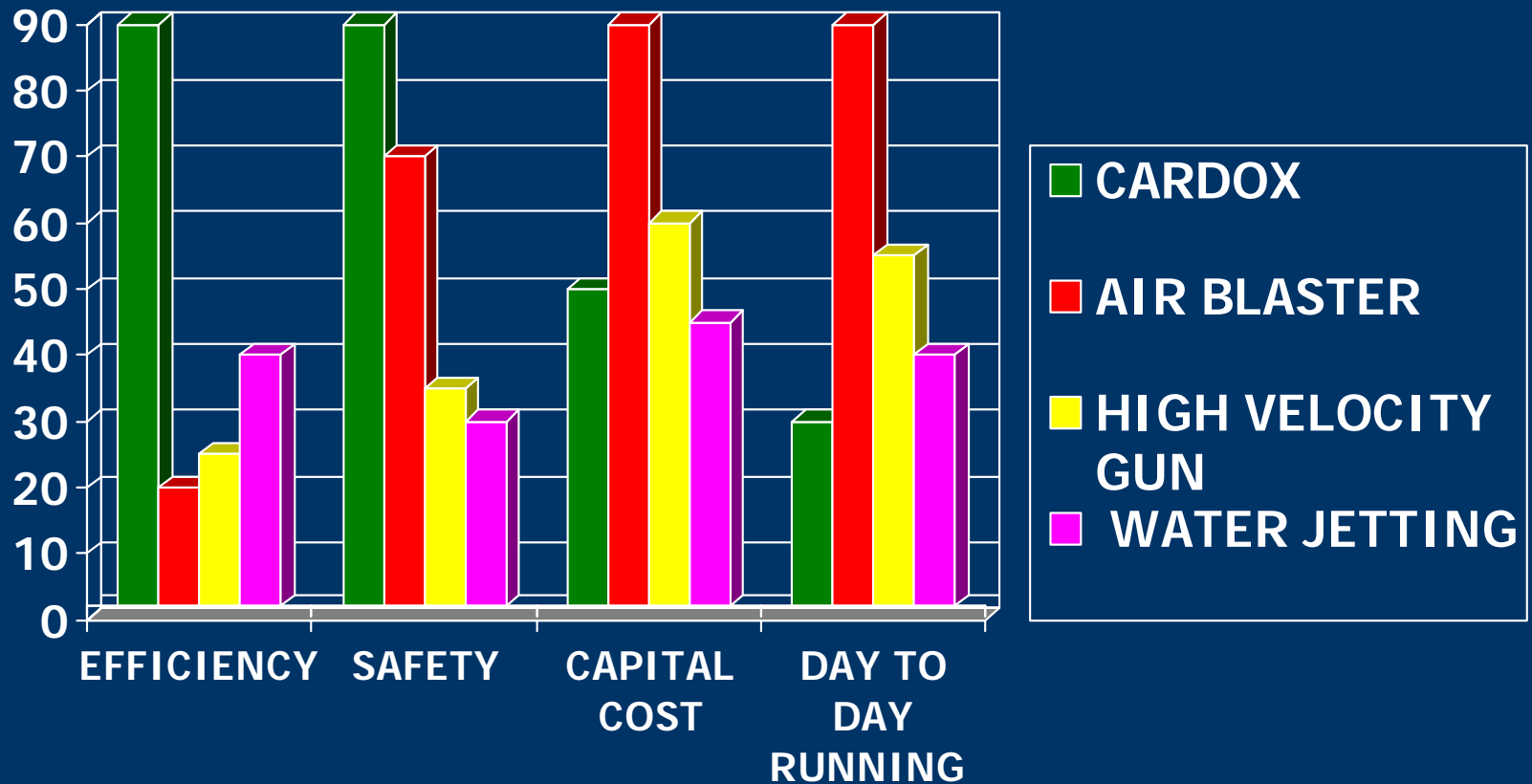
# CARDOX ... FAST & SAFE

- **CARDOX**
  - Removes build-ups in seconds.
  - No risk to workers.
- **HIGH PRESSURE WATER JETTING**
  - Can take several hours in some instances.
  - Workers prone to “Blow Back” of molten material.
  - Often causes scouring and damage to refractory lining.

# CARDOX ... LOW COST

- **AIR-SHOCKS**
  - Uses compressed air continuously 24 hours per day.
  - Running costs of the compressors are high.
  - High maintenance costs.
  
- **CARDOX**
  - Needs only to be used when build-up occurs.
  - Low maintenance.
  - Plants do not need to stop production

# CARDOX AGAINST OTHER METHODS





# THE ULTIMATE BUILD-UP CLEARING SYSTEM...



[CLICK HERE  
TO VIEW  
CARDOX  
ACTION CLIP](#)



# WHAT IS CARDOX ?

The Cardox System is NOW recognised as the **most efficient, reliable and cost effective** method of clearing build-ups in:

- PREHEATERS
- CYCLONES
- INLET CHAMBERS
- RISER DUCTS
- FEED PIPES
- ROTARY KILNS
- RAW FEED MILLS
- PRECALCINERS
- COOLERS
- SILOS .... AND ANYWHERE IN THE CEMENT PROCESSING LINE

# WHO USES CARDOX ?

ALL THE MAJOR CEMENT MANUFACTURERS....

- LAFARGE (& BLUE CIRCLE)
- HOLCIM
- CEMEX
- HEIDELBERG
- ITALCEMENTI
- RMC
- CIMPOR
- DICKERHOFF
- PORTLAND CEMENT
- AND MANY MORE....HAVE FOUND NO BETTER SOLUTION FOR KEEPING THE CEMENT PRODUCTION RUNNING AT FULL CAPACITY

# *WHERE IS CARDOX USED?*

In over 150 cement plants all over the world including:

Argentina ♦ Austria ♦ Australia ♦ Belgium ♦ Canada

Czech Republic ♦ France ♦ Germany ♦ Holland

Indonesia ♦ Ireland ♦ Israel ♦ Italy ♦ Kuwait ♦ Malaysia

Morocco ♦ New Zealand ♦ Philippines ♦

Portugal ♦ Peurto Rico ♦ Peru ♦ Saudi Arabia ♦ Senegal

South Africa ♦ Slovakia ♦ Slovenia ♦ Spain ♦ Sweden

Switzerland ♦ Thailand ♦ U.K. ♦ U.S. and more.....

# HOW TO APPLY CARDOX?



[1] Small Sockets & Plugs are installed in the area where build-ups usually occur

[2] Plug is removed to reveal build-up



[3] Small hole is drilled into build-up, 10~15cm deep

[4] Cardox Tube (filled with liquid CO2) is inserted through Tube Holder then through Socket into build-up

[5] Tube is activated and removed from Socket

