

# QA 103 – The Chemical Crusher: Drilling & Blasting Value Creation In The Pit – Bill Hissem & Larry Mirabelli



Improving Processes. Instilling Expertise.



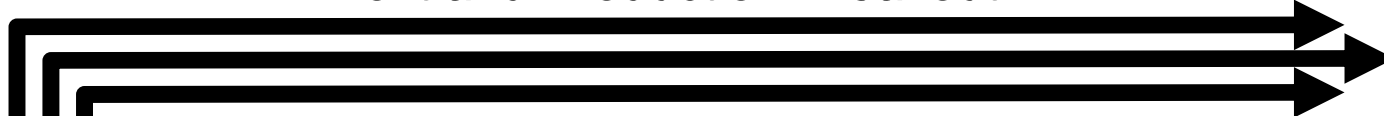
# Old Normal:

- Keep safe (**try hard**)
- Don't throw rock (**at least keep it on the property**)
- Don't disturb the neighbors (**very much**)
- Put rock on ground (**as much as possible**)

# New Normal:

- BE safe (**Zero incidents**)
- Don't throw ANY rock (**even on the property**)
- Don't disturb the neighbors! (**at all**)
- Put rock on ground (**with desired fragment size distribution**)

Profit and Production Breakout



Value Creation

DRILLING	BLASTING	LOADING HAULING	CRUSHING	SCREENING AND SIZING
				
REDUCING YOUR ENERGY FOOTPRINT THROUGH	REDUCING YOUR ENERGY FOOTPRINT THROUGH	REDUCING YOUR ENERGY FOOTPRINT THROUGH	REDUCING YOUR ENERGY FOOTPRINT THROUGH	REDUCING YOUR ENERGY FOOTPRINT THROUGH
Value Chain Management	Value Chain Management	Value Chain Management	Value Chain Management	Value Chain Management

# Advanced Tools

- Models
  - Blast Fragmentation
  - Blast Vibration
  - Plant Process Optimization
- Blast design software
- Improved survey equipment
- More accurate and precise rock drills
- Advanced bulk emulsion explosive loading systems
- Accurate and precise electronic detonators



**The Chemical Crusher**

# Chemical Crusher – Drill/Blast

1. It is fully portable and built on the rock bench.
2. It is disposable and fully consumed on each use.
3. Except for the diesel and/or electricity to build it, it is internally

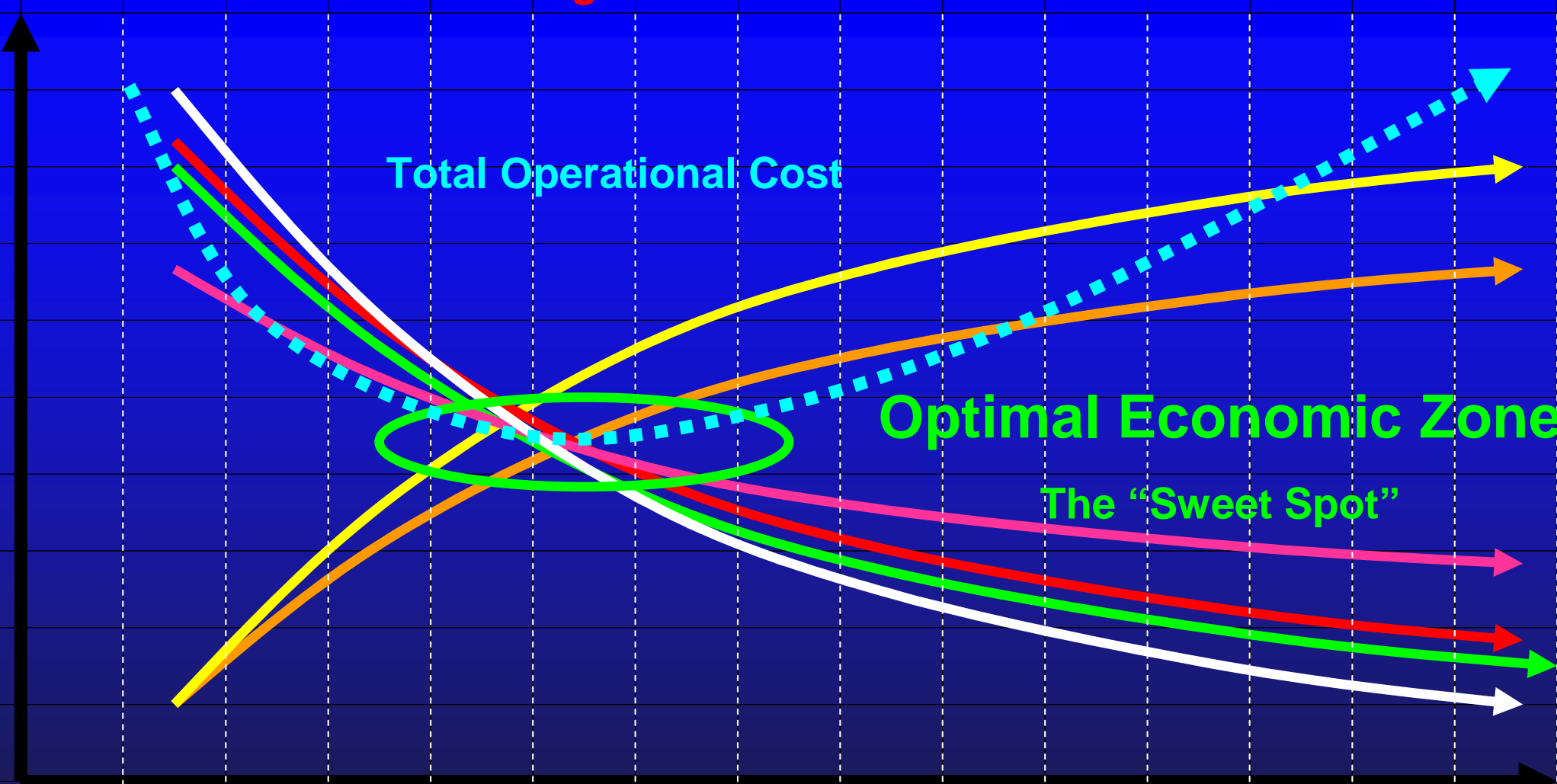
**The Chemical Crusher is our breakout opportunity for process improvement.**

and blast services are contracted out.

5. It has design flexibility with respect to varying production volumes, changing rock conditions and producing different rock size gradations.

Drilling      Blasting      Secondary Breakage      Loading      Hauling      Crushing

\$ per Ton



Total Operational Cost

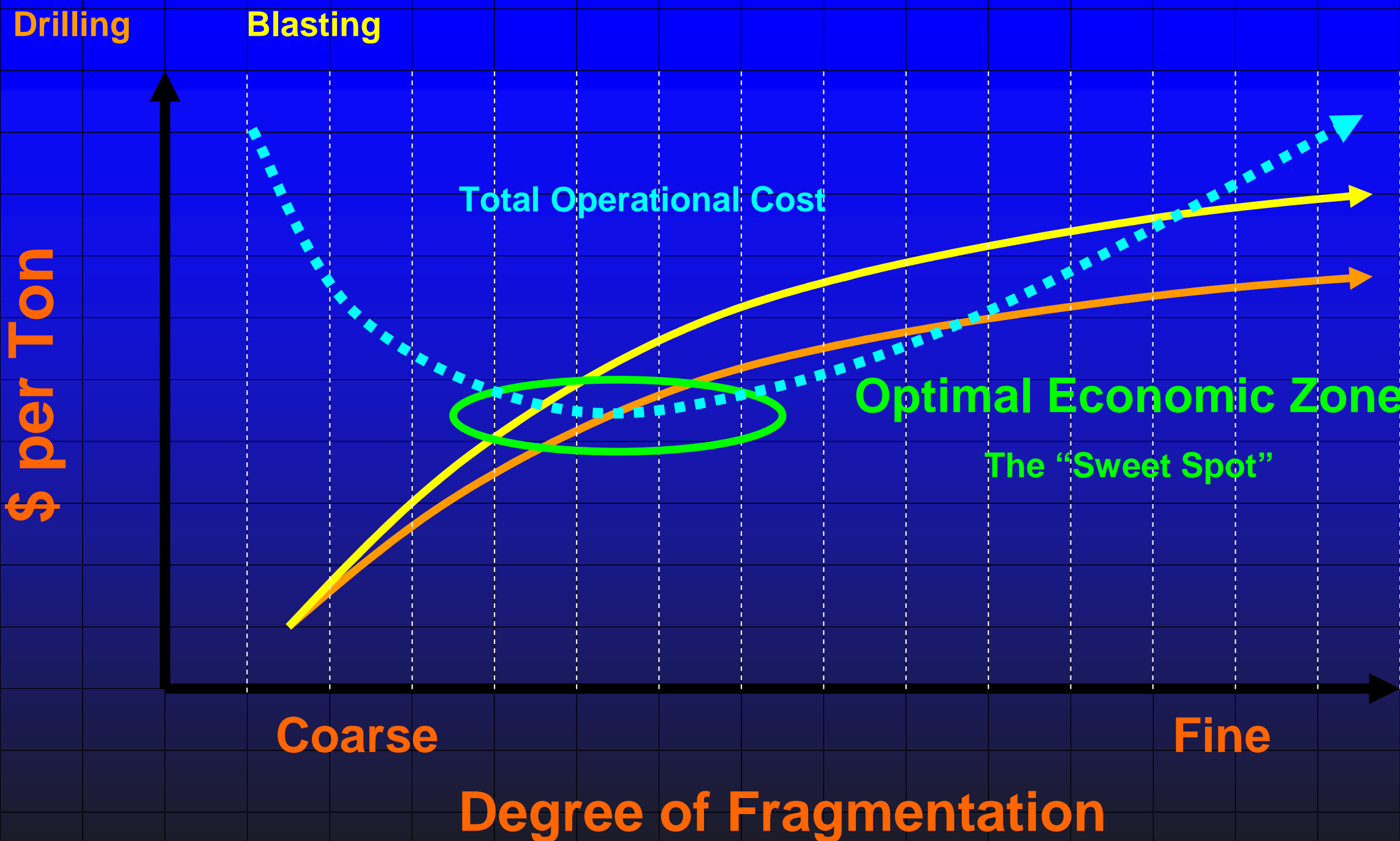
Optimal Economic Zone  
The "Sweet Spot"

Poor

Excellent

Degree of Fragmentation





Drilling

Blasting

Total Operational Cost

\$ per Ton

Optimal Economic Zone

The "Sweet Spot"

Coarse

Fine

Degree of Fragmentation







# The Chemical Crusher: Drilling & Blasting

Exactly Right Energy

Exactly Right Place

Exactly Right Time

**Drilling is about the  
40 hour event.**



**Loading is about the  
4 hour event.**



**Blasting is about the 4 second event.**

**Value Creation  
Moment!**

# Drill Section

The roll of **drilling**

in exactly :

Right Energy

**Right Place**

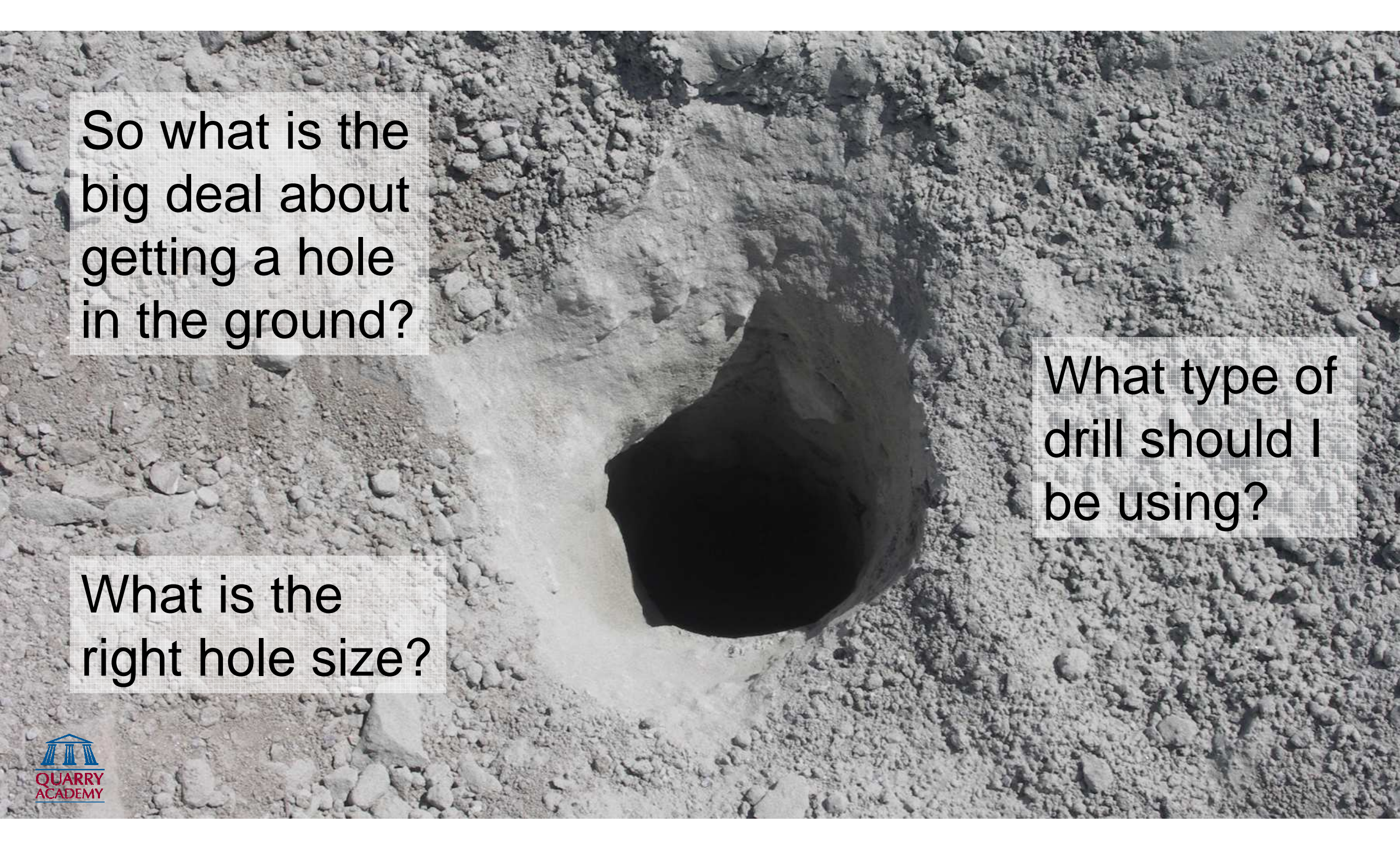
Right Time

**What hole size?**

**Which type of drill?**

**How do I use it?**





So what is the big deal about getting a hole in the ground?

What type of drill should I be using?

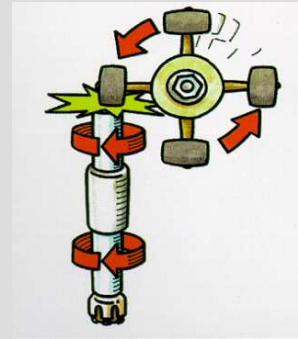
What is the right hole size?



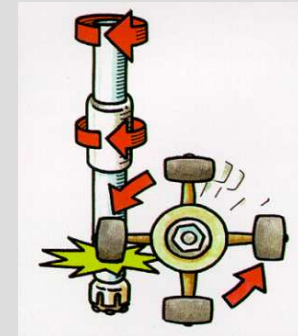
# Drill Types

## 3 Principal Technologies

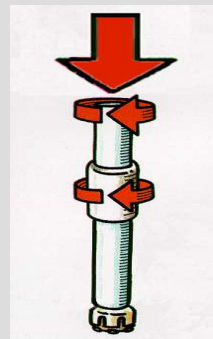
- Top Hammer



- DTH (Down-The-Hole)



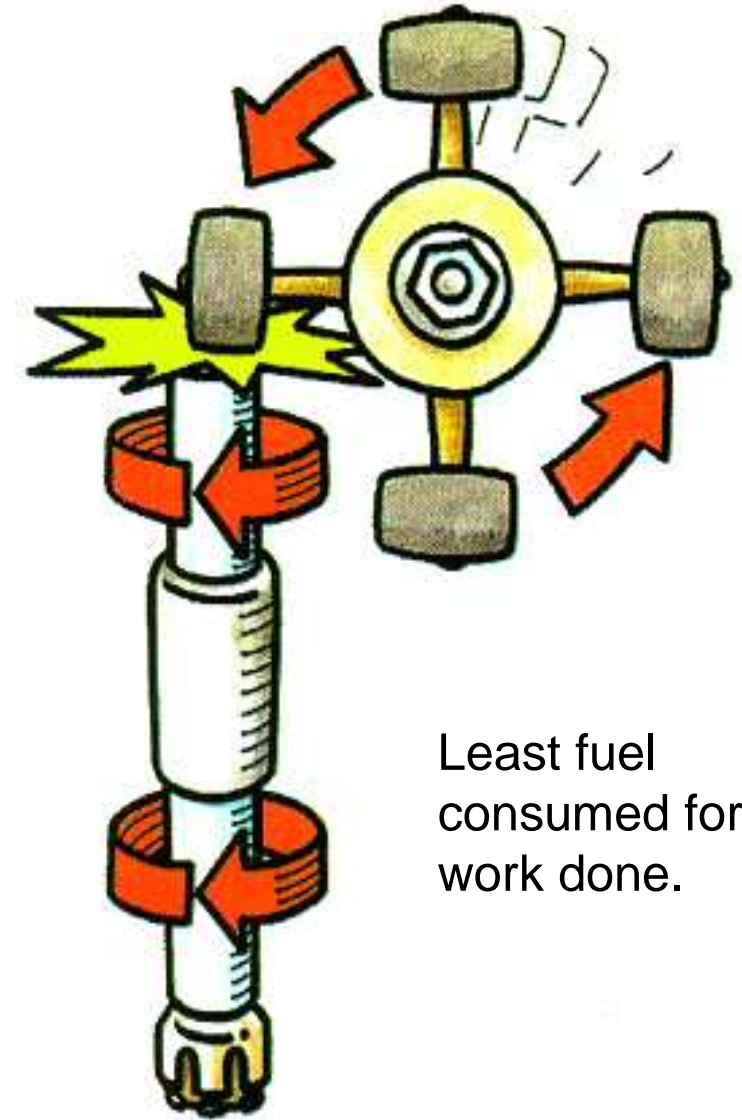
- Rotary



# Drill Types

## 3 Principal Technologies

# Top Hammer

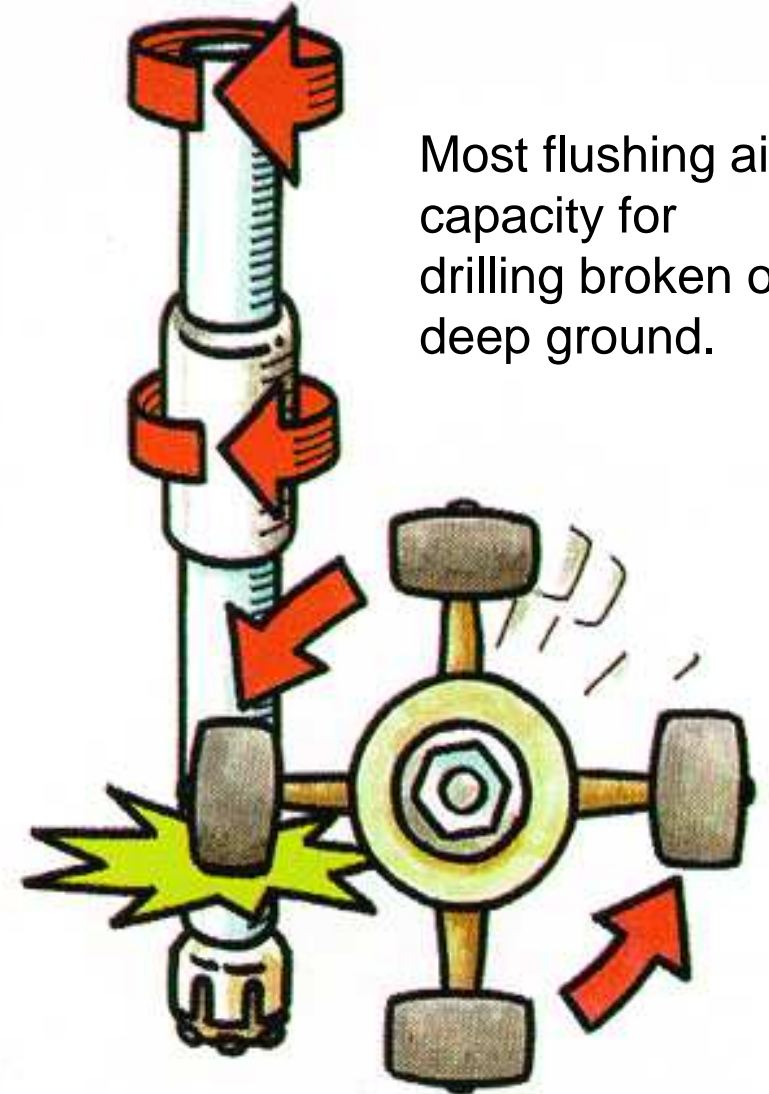


Least fuel  
consumed for  
work done.

# Drill Types

## 3 Principal Technologies

# DTH (Down-The-Hole)

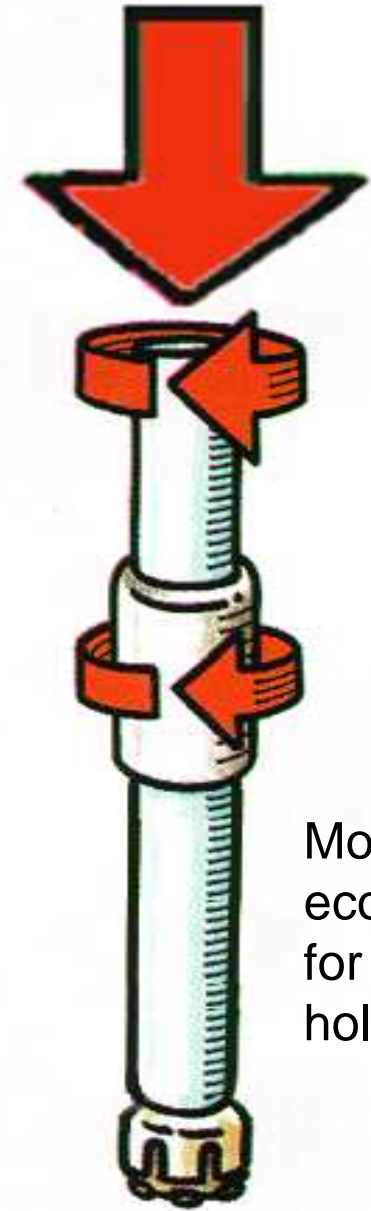


Most flushing air capacity for drilling broken or deep ground.

# Drill Types

3 Principal Technologies

## Rotary



Most economical for big holes.