



# Mine Support

تدعيم المناجم

# Why do we support mines?

لماذا ندعم المناجم؟

- Keeping miners safe (safety factor).
- Ensure continuity of ore production to avoid shortage in profit.
- Finally, keeping expensive machines in the underground mines safe (e.g. machines used in long wall mining).

# When do we need to support mines?

متي نحتاج ان ندعم المناجم؟

- If there are weak or unconsolidated parts of rocks are present in the roof and walls of mines.
- If there some geologic structures (e.g. shear zone) that weaken rocks.
- If there are voids and spaces in the rocks.
- If there are some clay beds that can shrink and expand due to its swelling property, and hence sliding of rocks in presence of water can be expected.
- If there are underground water that helps in chemical weathering leading to loose rocks and corrosion of machines.

# How do we support mines?

كيف ندعم المناجم؟

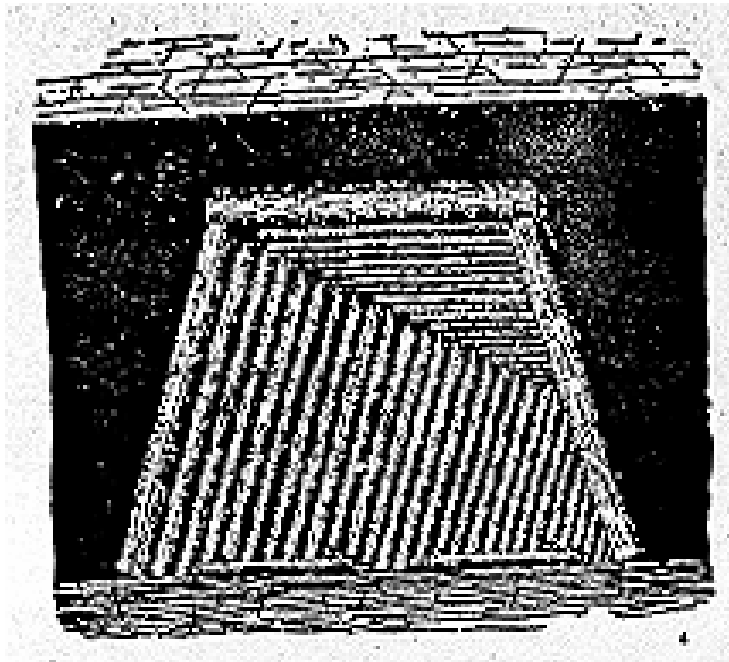
- It is the job of mine engineer but with consultation with the mine geologist.
- There are 6 (six) types of mine support:
  - (1) Wooden logs support
  - (2) Support using metal rods
  - (3) Support using metal pins or roof bolts
  - (4) Support using metal fence (net)
  - (5) Concrete support and using brick walls
  - (6) Resin support



The background of the slide is a close-up photograph of crocodile or alligator skin. The texture is highly detailed, showing a series of overlapping, bumpy scales that form a diamond-like pattern. The color is a mix of dark brown, olive green, and greyish-blue, with some lighter patches where the scales are more pronounced.

# **(1) Wooden Logs Support**





Good wood quality (✓)







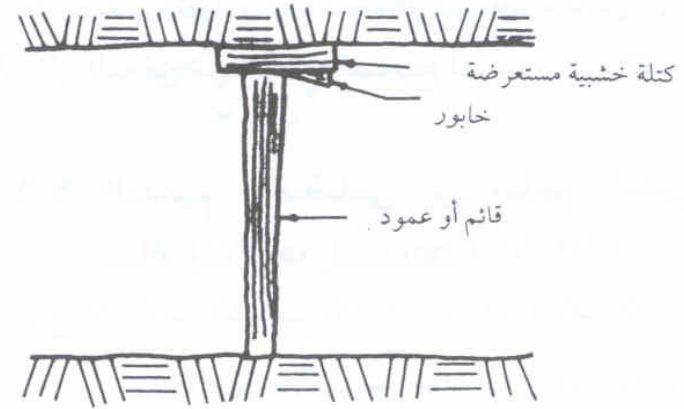
- Wood logs (trunks) should be straight and about 4-6 m long
- Evergreen trees are recommended (e.g. pine trees)
- Iron wedges must be used to fix the wooden logs



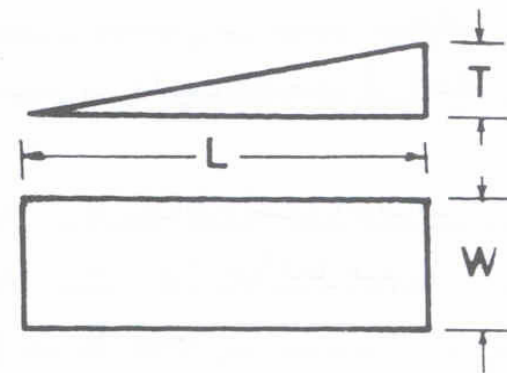




## Fixation of the wood trunks with iron wedges



شكل (٩.١١) طريقة التدعيم بالقوائم أو الأعمدة .



شكل (٩.١٢) خابور لتثبيت الدعامة .

# Bad wood quality (X)







# Advantages and disadvantages of wooden logs support:

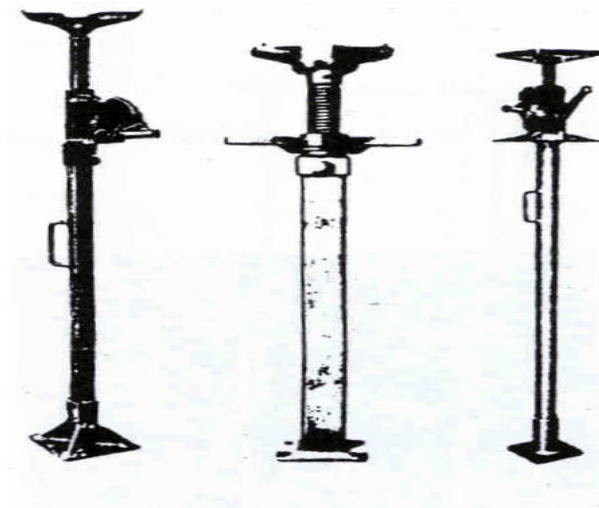
## \*Advantages: المزايا

- Cheap even when it is imported from abroad.
- Can be cut to the desired length.
- Gives early warning when it swallows

## \* Disadvantages: العيوب

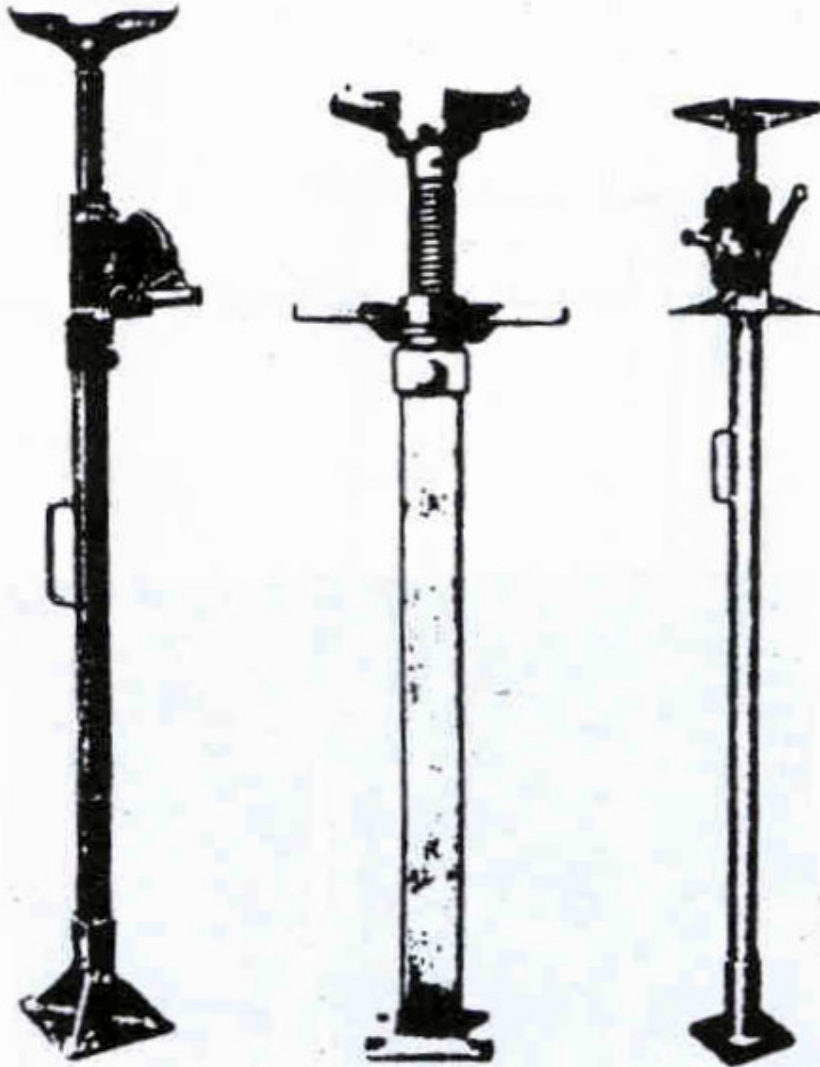
- Wood trunks can not be reused in other mines.
- If wood swallows, another type of mine support should be applied.
- Wood must be coated to avoid corrosion by mine water, insects, bacteria, .....etc.





## **(2) Support Using Metal Rods**

# Support Using Metal Rods



Simply, it is a metal rod consists of two cylinders of different diameters.

Length can be controlled using pins and moving upward & downward

الدعامات الرافعة ذات القلاووظ



# Advantages and disadvantages of metal rods support:

## \*Advantages: المزايا

- Rods can be easily re-used again (e.g. in other mine).
- Length (height) can be easily controlled.
- Gives high support capacity.

## \*Disadvantages: العيوب

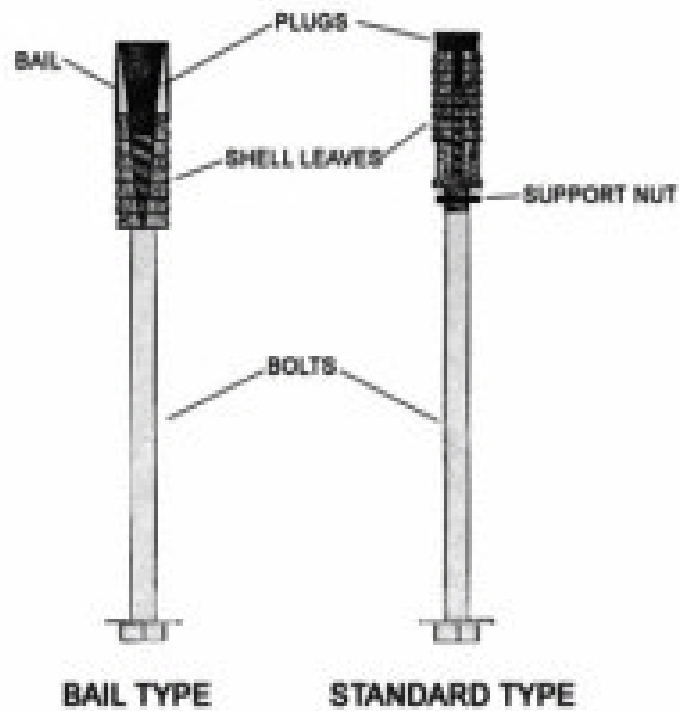
- Expensive.
- Does not give early warning like wood trunks.
- Moisture and mine water can cause corrosion of metal.



### (3) Support Using Metal Pins or Roof Bolts



# Sketch of roof bolt





# Support Using Metal Pins or Roof Bolts

➤ Usually used for ceilings only.

A 1-1.5 m hole is needed, with 1.4 cm diameter.

Bolts and pins must have ribs for good support.

## Advantages and disadvantages of metal rods support:

### \*Advantages: المزايا

- Necessary for ceilings that have weak fractures in hard rocks.
- High support capacity.

### \* Disadvantages: العيوب

- Expensive.
- Not suitable for soft rocks
- Moisture and mine water can cause corrosion of metal.

## **(4) Support Using Metal Fence (Net)**

## Support Using Metal Fence (Net)

➤ Usually used for ceilings only, especially in case of rock fall.

Metal pins are needed to fix the metal fence.

Can be used for walls also but if clay beds are missed.

### Advantages and disadvantages of metal fence support:

#### \*Advantages: المزايا

- Necessary for ceilings that have weak fractures in hard rocks.
- Gives early warning in case of mine collapse.
- Collect falling rocks.
- Reasonable support capacity.

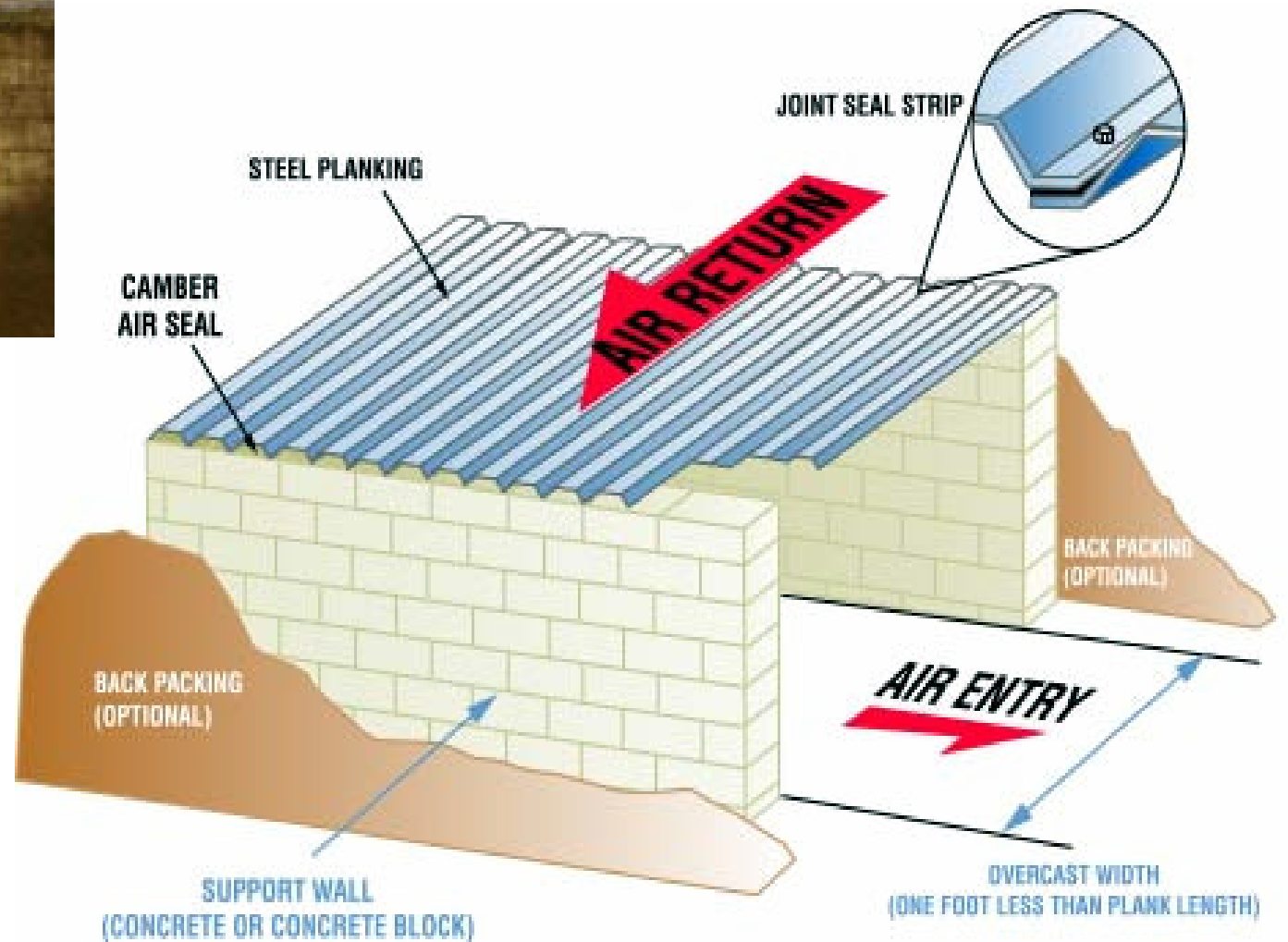
#### \*Disadvantages: العيوب

- Expensive.
- Not suitable for soft rocks
- Moisture and mine water can cause corrosion of metal.





## **(5) Concrete Support and Using Brick Wall**





# Concrete Support and Using Brick Wall

➤ Usually used for walls with clay beds, or when the bedrock is friable and brittle.

Concrete can bear more stress than bricks.

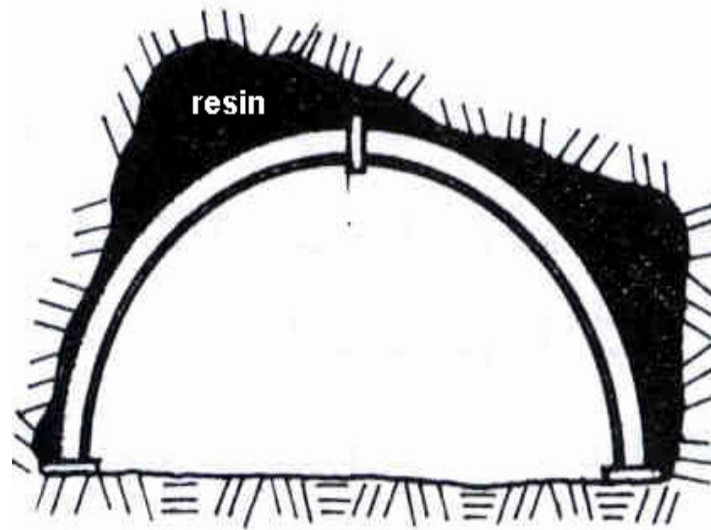
## Advantages and disadvantages of concrete and brick support:

### \*Advantages: المزايا

- Necessary for friable and clayey bedrocks.
- Perfect support capacity.

### \* Disadvantages: العيوب

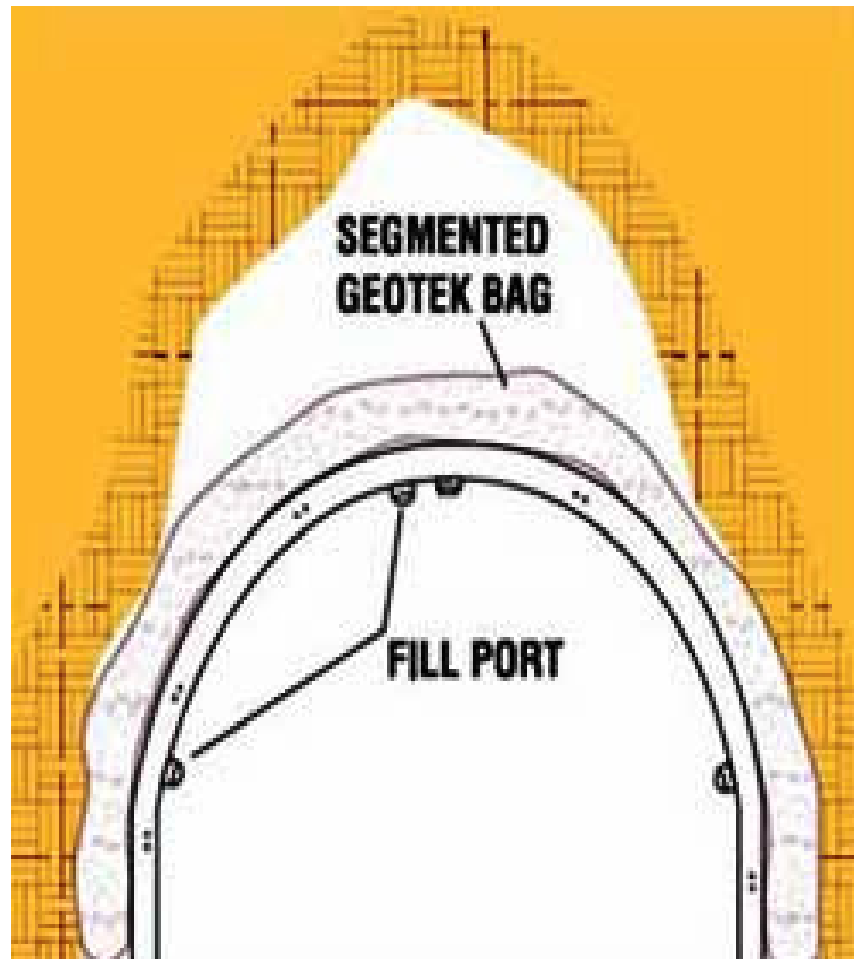
- Relatively expensive.
- Can not be easily modified or removed.



## (6) Resin Support



# Sliding arch canopy



# Resin Support

➤ Usually used for friable and porous ceilings and walls.

An organic stuff (polymers) is used for injection.

## Advantages and disadvantages of resin support:

### \*Advantages: المزايا

- Ideal for friable and porous bedrocks.
- Injection is an easy job and not environmentally harmful.

### \* Disadvantages: العيوب

- Relatively expensive.

# Other Uncommon Types of Mine Support

## Metal bars & plates





## Factors controlling choice of suitable type of mine support:

- (1) Availability of support material in the local market & costs of support materials (even those imported from abroad).  
Distance to brick, cement and steel factories.  
Nature of problem (to be solved) in the mine.  
Durability of the mine.