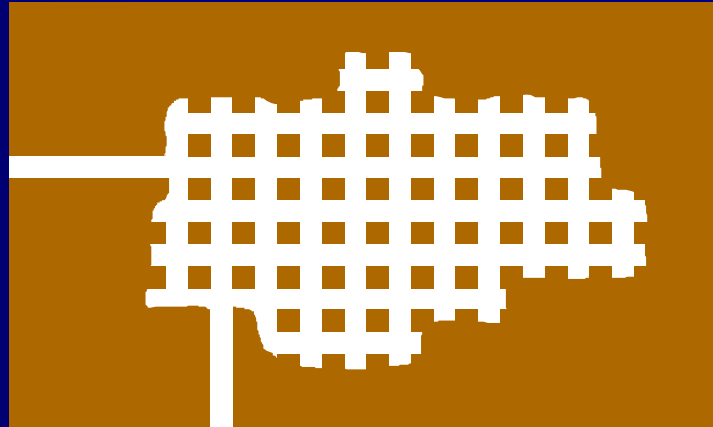


Room and Pillar Mining



Pillar Design 1

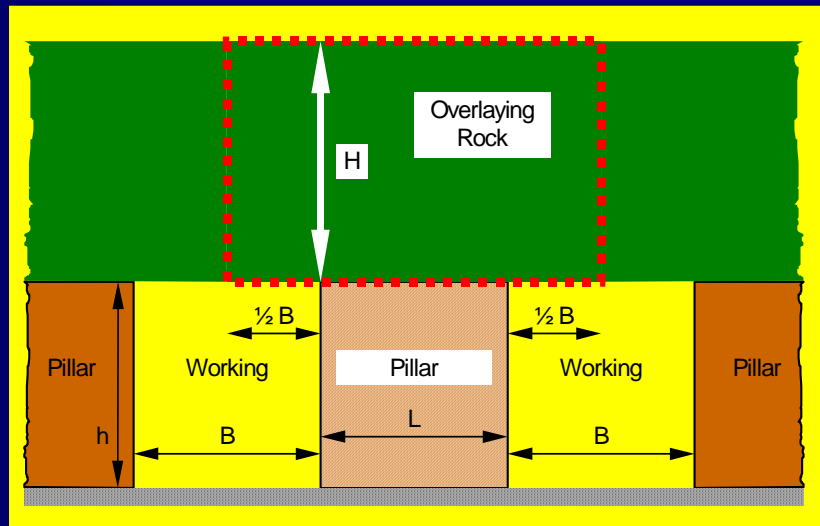
Factors of Influence

- ◆ Stress
- ◆ Rock Mass Properties
- ◆ Geologic Conditions
- ◆ Spatial relations of pillars and workings
- ◆ Location of pillars

Rule of Thumb:

The greater the depth, the bigger the pillar!

Pillar Design 2



Pillar Design 3

Volume of overlying rock

$$V = H \cdot (L + B)^2$$

Stress σ_D
calculated with density ρ
and gravity g

$$\sigma_D = \frac{\text{Weight overlying rock}}{\text{Pillar plane area}}$$

$$= \frac{V \cdot \rho \cdot g}{L^2} = \frac{H \cdot (L + B)^2 \cdot \rho \cdot g}{L^2}$$

Pillar Design 4

Compressive Strength of Pillar

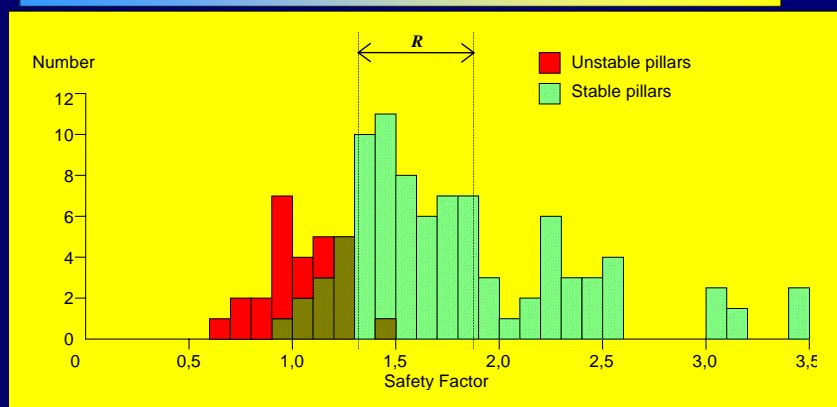
$$\sigma_F = c \cdot L^\beta \cdot H^\alpha$$

- c compressive strength of rock cube 0,3 m [MN/m²]
- H Hight of pillar [m]
- L Lenght of pillar [m]
- α -0,66
- β 0,46

Safety factor S

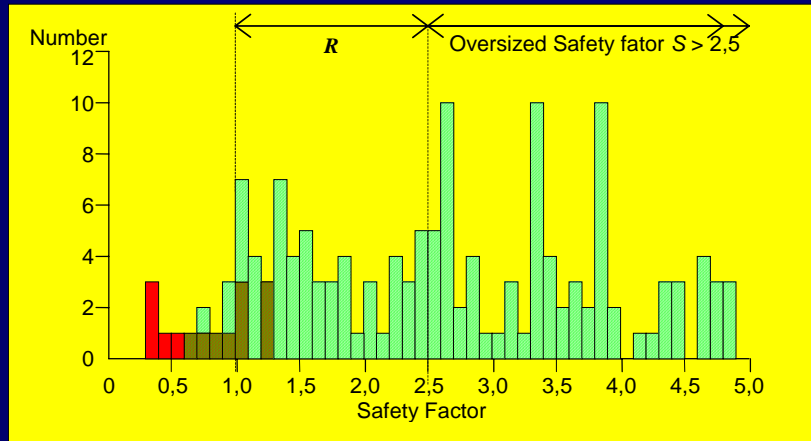
$$S = \frac{\sigma_F}{\sigma_D}$$

Pillar Design 5



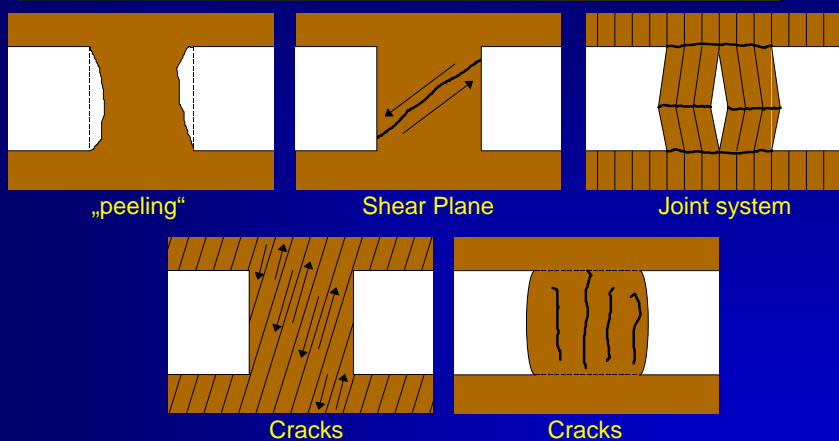
Stable and unstable pillars in south african coal mines after Salamon and Munro

Pillar Design 6



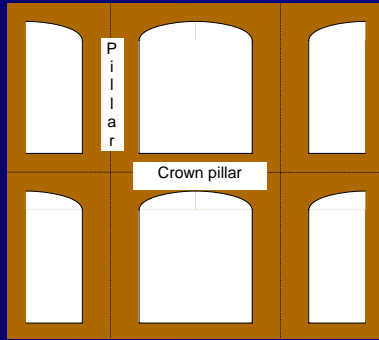
Stable and unstable pillars in american coal mines after Bienawski

Pillar Design 7



Pillar Design 8

favourable



unfavourable

