

ARC INNOVATIONS

A yellow swoosh underline that starts under the 'C' of 'ARC' and extends to the right, ending under the 'S' of 'INNOVATIONS'.

Zero and Low Cement Mining Applications

Shotcrete



- **40MPa at 28 days**
- **1MPa at 1 Hour**
- **Blend of Wet Tailings and Binder**
- **Blended material open time longer than 1 week**
- **Energy Absorption 900J**

Shotcrete

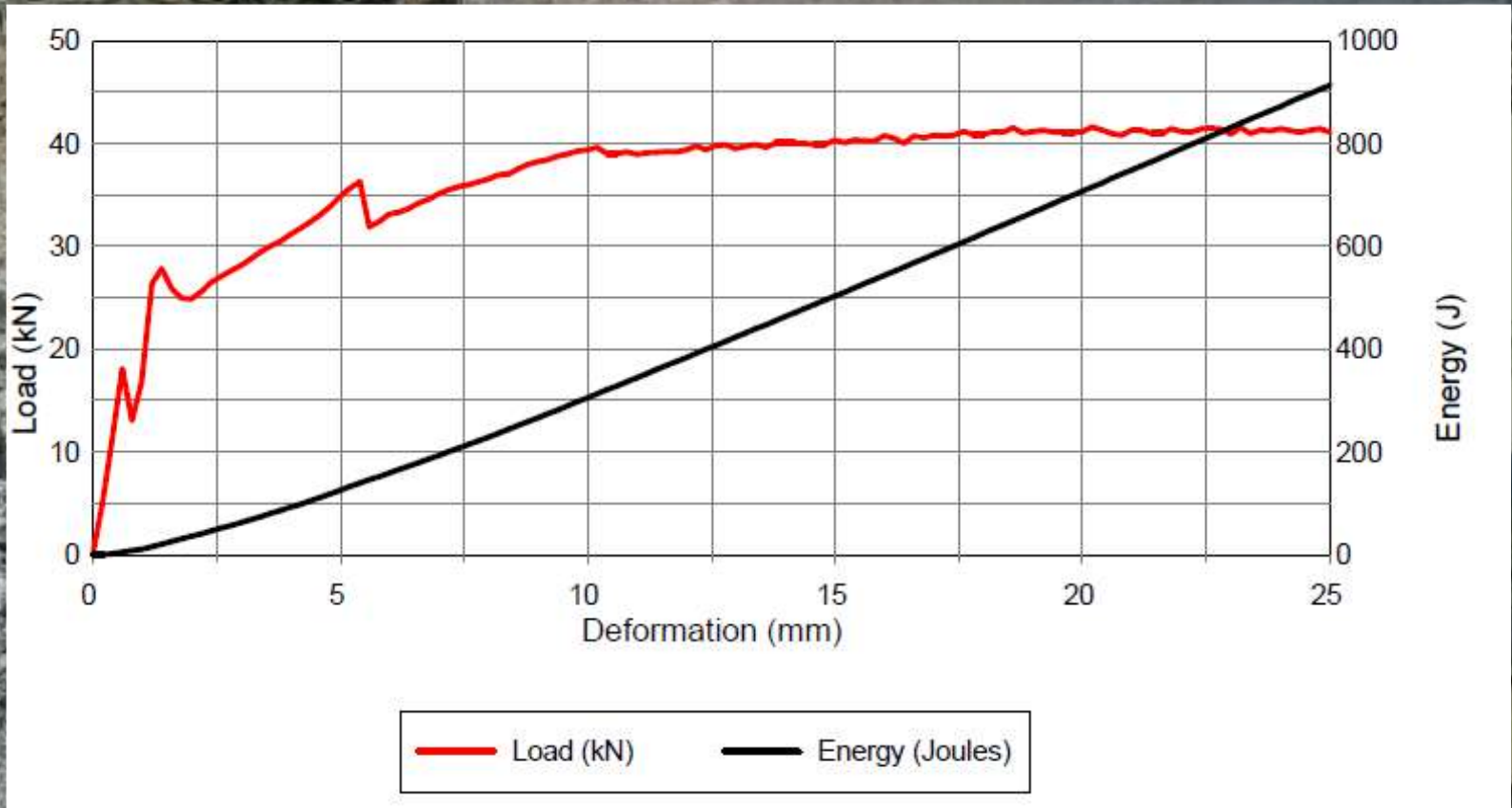


Flexural Strengths
7MPa at 7 days
12MPa at 28 days

Compressive Strengths
40MPa at 7 days
55MPa at 28 days

Saving on carbon emissions
 $\pm 500 \text{ kg.CO}_2/\text{m}^3$

Shotcrete

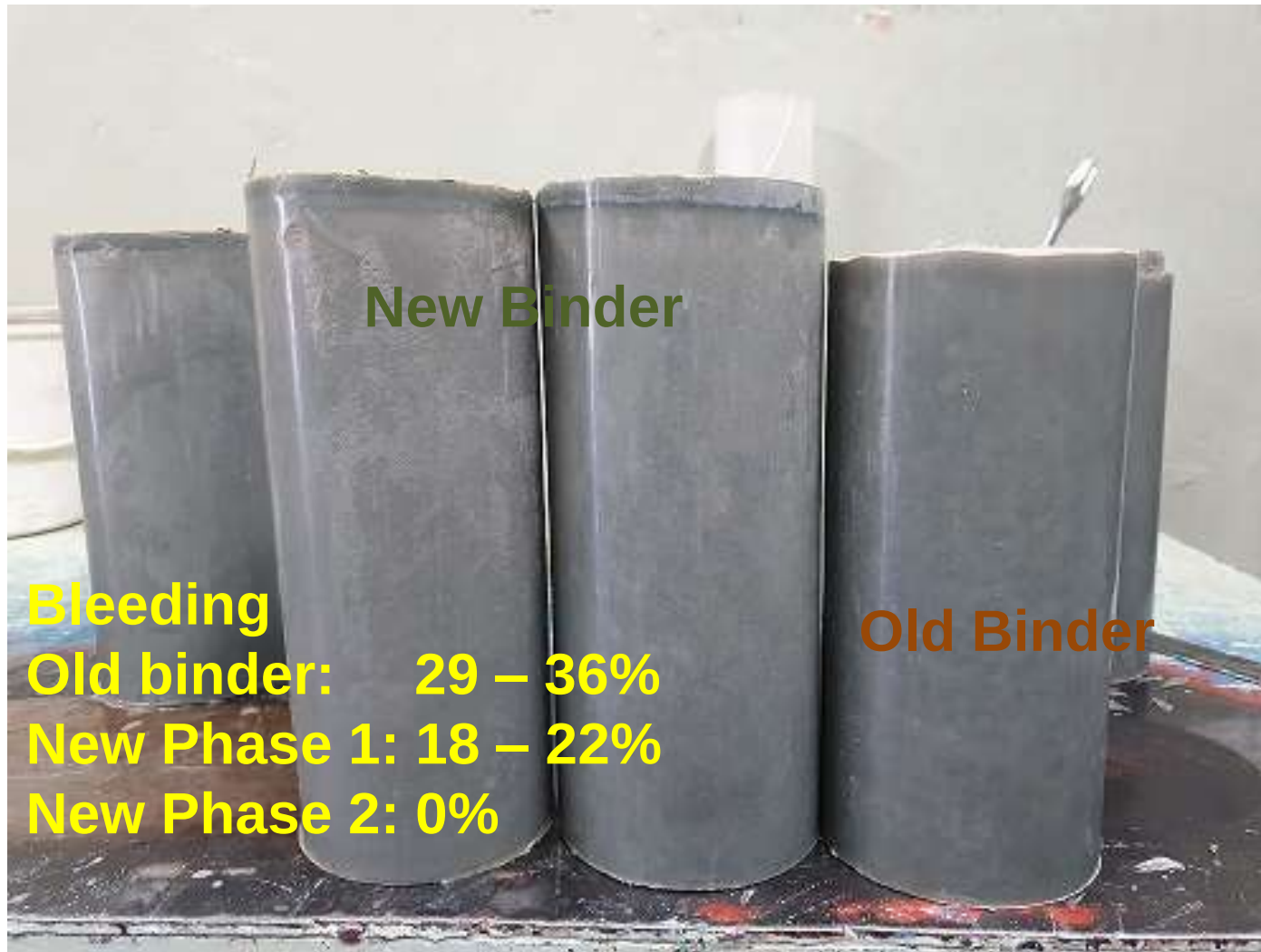


Backfill

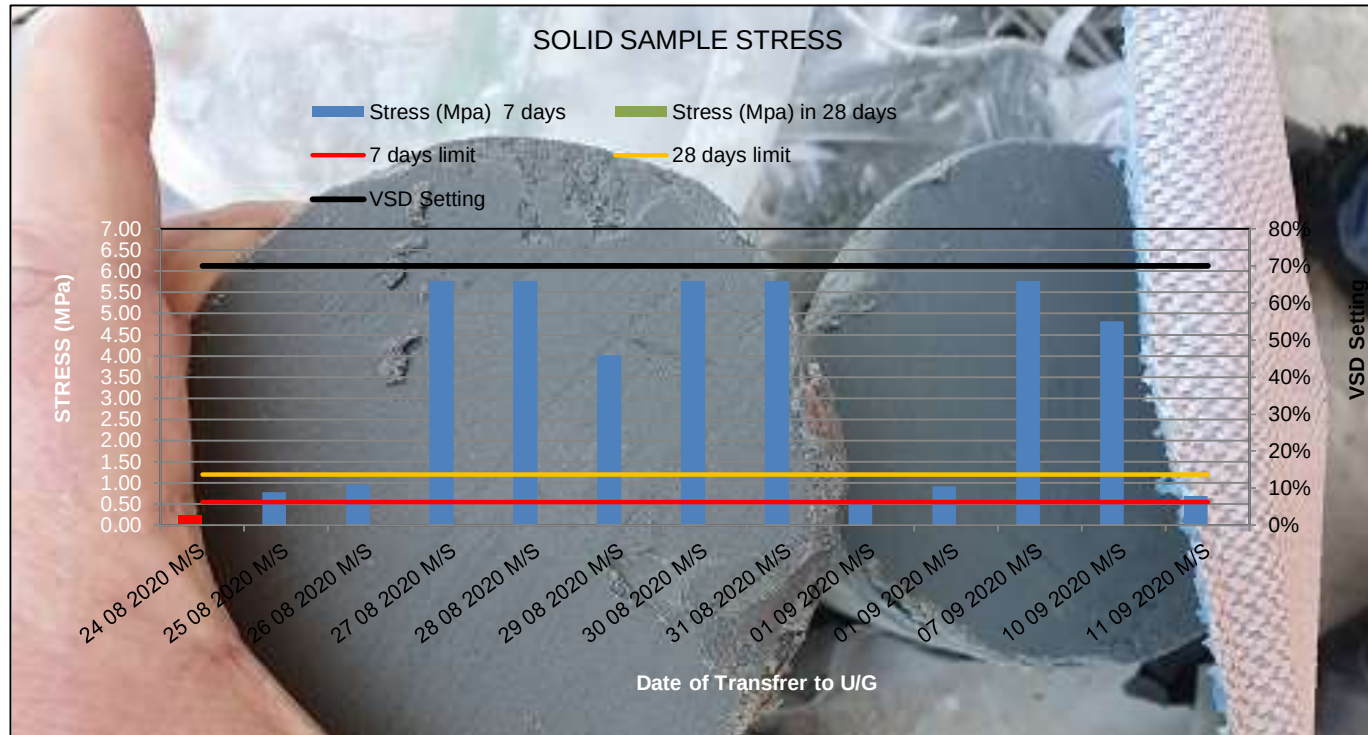


- **0.55MPa at 7 days**
- **1.2MPa at 28 days**
- **1700 – 1850 kg/m³**
- **6.5 – 12 seconds**
- **Minimum bleed**

Backfill



Backfill



Costing Differential
Saving R2.6M

Roadway



Vehicle Traffic 2 hours

Good drainage

Non-slip

Low wear

Roadway

45 – 55% material sourced from underground

Optimal usage of the upgraded pipe network

Compressive Strengths of 1 – 100MPa

Massive Reduction of carbon emission

Low wear

City Deep Container Terminal

	40MPa	40MPa
42.5 CEM II A-M(V-L)	203	0
PFA	238	240
GGBS	0	360
38mm Granite	828	0
19mm Granite	207	925
Andesite Crusher Sand	783	480
Vaal River Sand	80	185
Water (ℓ)	175	200
Sodium Silicate (ℓ)	-	20
Sodium Hydroxide (ℓ)	-	20
w/c ratio	0.39	0.33
Slump (±25mm)	150	150
Compressive strength @ 28 days (MPa)	55	51
Compressive strength @ 1 year (MPa)	125	70
Compressive strength @ 2 years (MPa)	-	75
Compressive strength @ 3 years (MPa)	-	76
Oxygen Permeability Index @ 28 days	9.77	9.7
Oxygen Permeability Index @ 1 year	10.22	10.82
Shrinkage (%)	0.044 – 0.049	0.022 – 0.028

3.71mm



2.67mm

- ☐ Background
- ☐ Crack/Hole
- ☐ Cement: Lime/Periclase
- ☐ Cement: Calcium Silicate
- ☐ Cement: Calcium Aluminium Silicate
- ☐ Cement: Calcium Fe-Al- Silicate
- ☐ Cement: Calcium Aluminate
- ☐ Cement: Sulphur Enriched
- ☐ Cement: Calcium Silicate - K (ASR)
- ☐ Aggregate: Muscovite
- ☐ Aggregate: Sand(Quartz)
- ☐ Aggregate: Clay(Kaolinite)
- ☐ Aggregate: Clay(Swelling)
- ☐ Dolerite: Clinopyroxene
- ☐ Dolerite: Orthopyroxene
- ☐ Dolerite: Anorthite
- ☐ Dolerite: Ilmenite
- ☐ Dolerite: Magnetite(Ti)
- ☐ Hematite/Iron Oxide
- ☐ Pyrite
- ☐ Zircon
- ☐ Others

Strength

51MPa @ 28 days – Compressive
4.2MPa @ 28 days – Flexural

Chemical Plants



Precast

