MULTOTEC

OPTIMISING DESLIMING CIRCUITS WITH CLASSIFYING CYCLONES

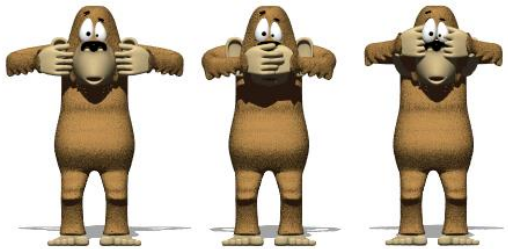
SACPS Coal Metallurgists & Plant Operators Workshop
Frikkie Enslin – MPE Applications Manager
21 September 2022

Disclaimer!

L – Excessive use of the F-word… “Fines”

V – Value adding tips and tricks

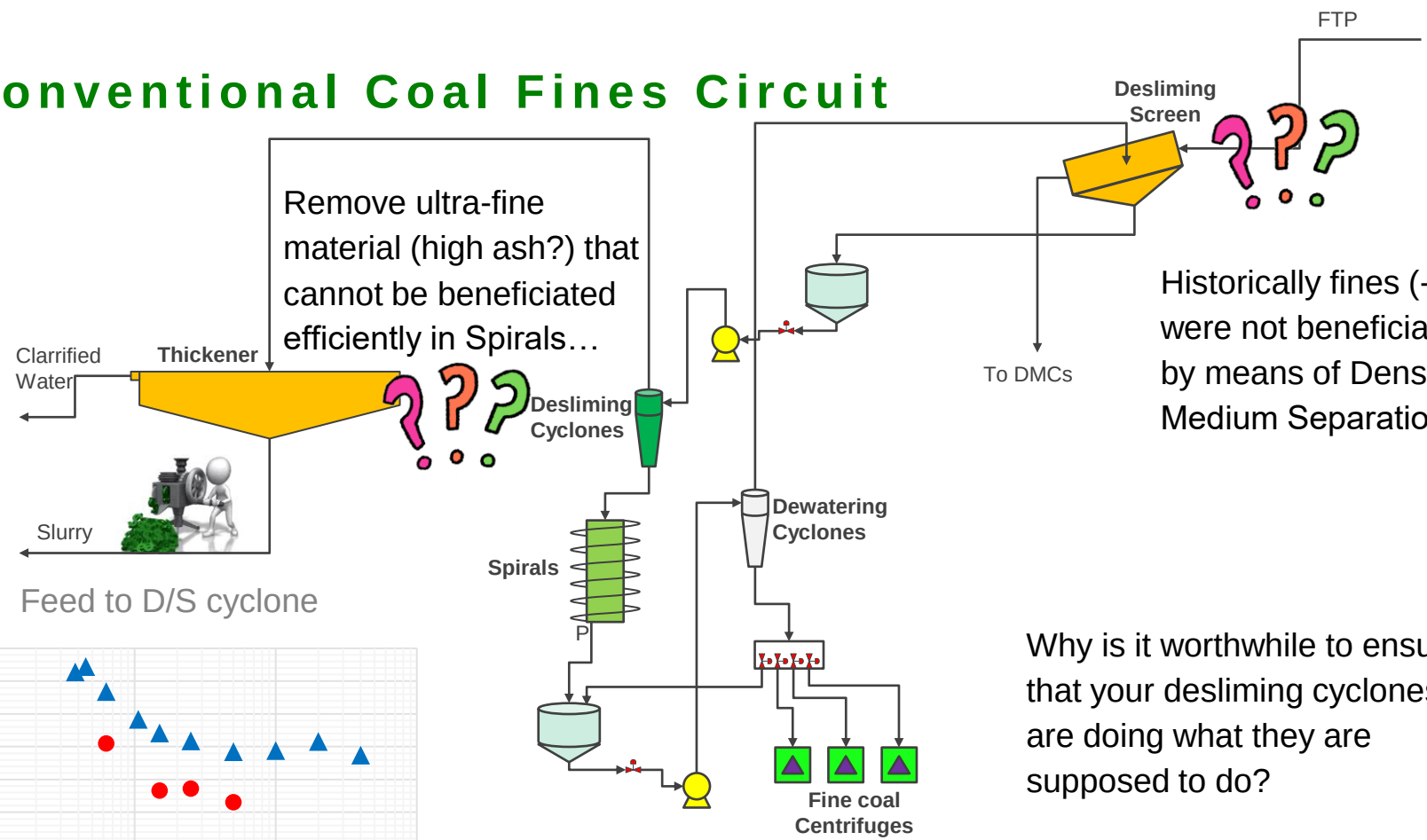
L V N S



N – New / renewed focus on a brilliant piece of technology

S – Fortunately no selling today, only sharing

Conventional Coal Fines Circuit

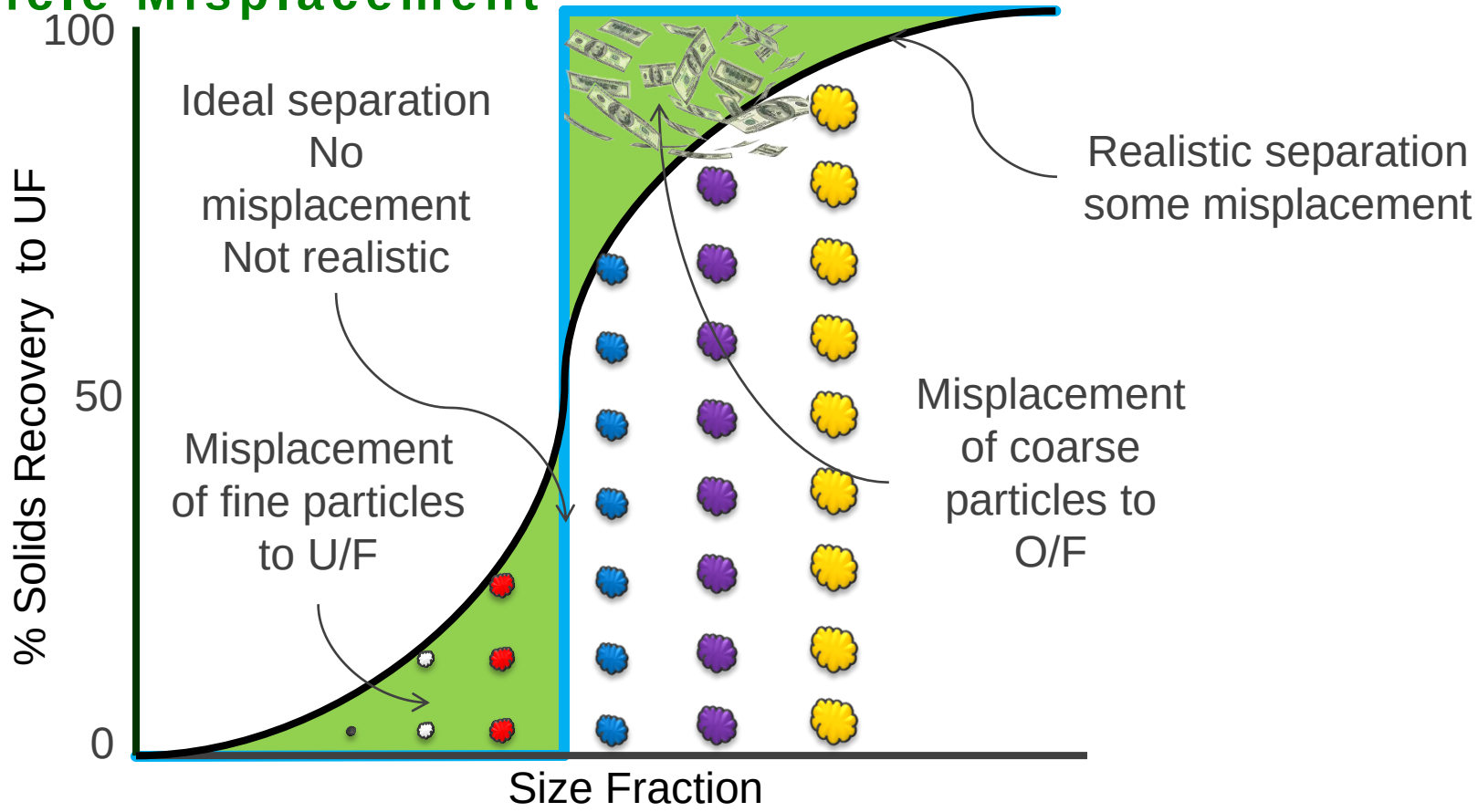


Historically fines (-1mm) were not beneficiated by means of Dense Medium Separation…

Feed to D/S cyclone

Why is it worthwhile to ensure that your desliming cyclones are doing what they are supposed to do?

Particle Misplacement



What can be done?

How do we reduce the potential revenue we're discarding in our desliming cyclones' overflow?

- Reduce the desliming cyclone cut point
- Minimise misplacement of coarse particles to the overflow
- Preventative maintenance and best operational practices
- New / fresh thinking around the fines circuit

The first prize will be to get the best out of whatever is already on site.

Reduce desliming cyclone cutpoint

Reducing the desliming cyclone cut point = minimise loss of coarse material to the overflow.

The following options are available to achieve this without installing smaller diameter units:

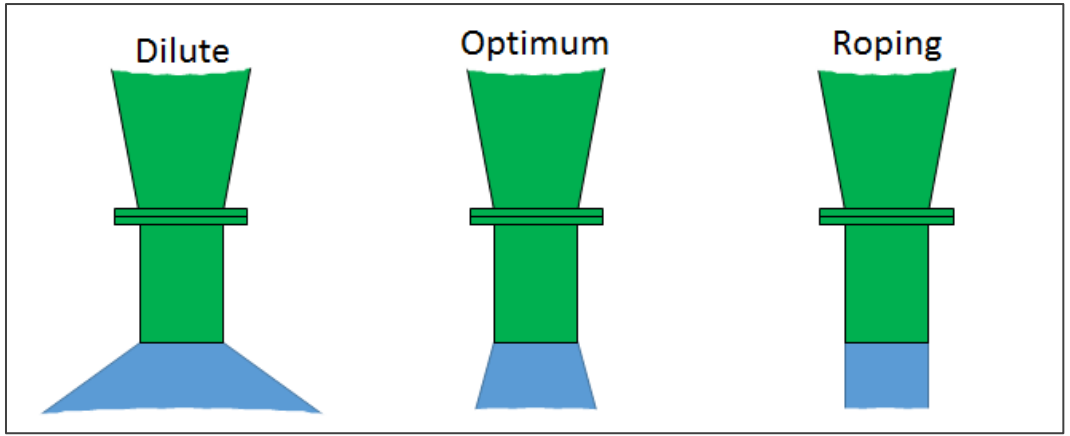
- Installing larger spigot diameters → Increased θ (including fines!)
- Installing smaller vortex finders → Finer cutpoint & reduced cyclone capacity
- Reduction of cyclone feed solids concentration → Better efficiencies, pumps?

Make sure you understand the impact these changes will have on:

- Spiral plant capacity
- Dewatering cyclones
- Thickener & Filter press

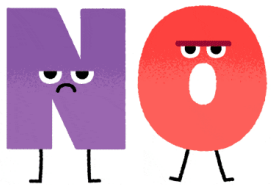
Minimise coarse particle misplacement

- Feed pressure
  - Main causes for fluctuations in feed pressure:
    - Incorrect feed sump design (solids shouldn't be slumping on the sides of the sump)
    - The sump's level control may be faulty
    - There may be fluctuating feed into the sump
  - Too high – accelerated wear
  - Too low – air core instability
- Spigot discharge profile
- Overflow siphoning



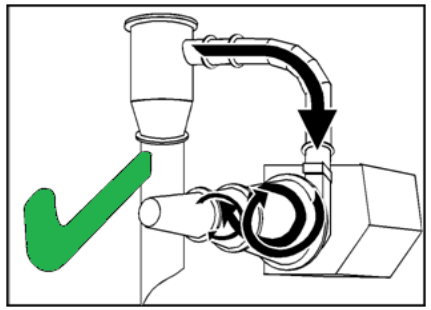
Minimise coarse particle misplacement

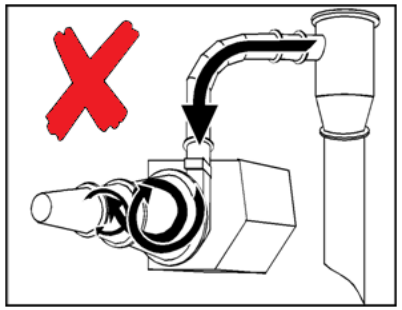
- Cyclone carries the weight of the feed pipe
- Weight pulls the alignment of cyclone internals skew
- Bend in the feed close to the cyclone's inlet
- Surging pump

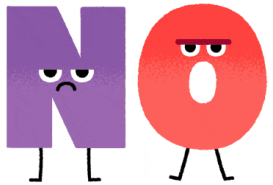


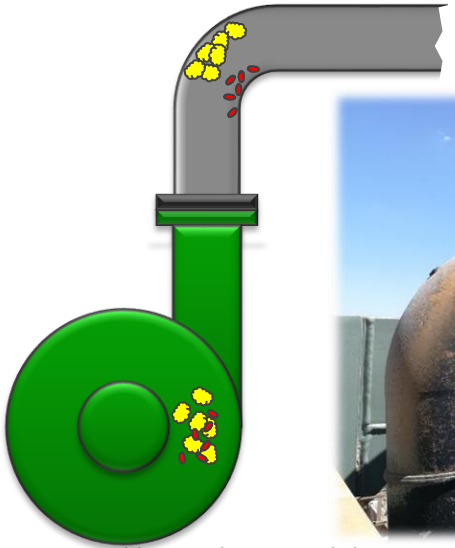
- The weight of the feed pipe should be supported by infrastructure
- Feed pipe should be straight for at least 9 pipe diameters
- Constant feed conditions

Minimise coarse particle misplacement

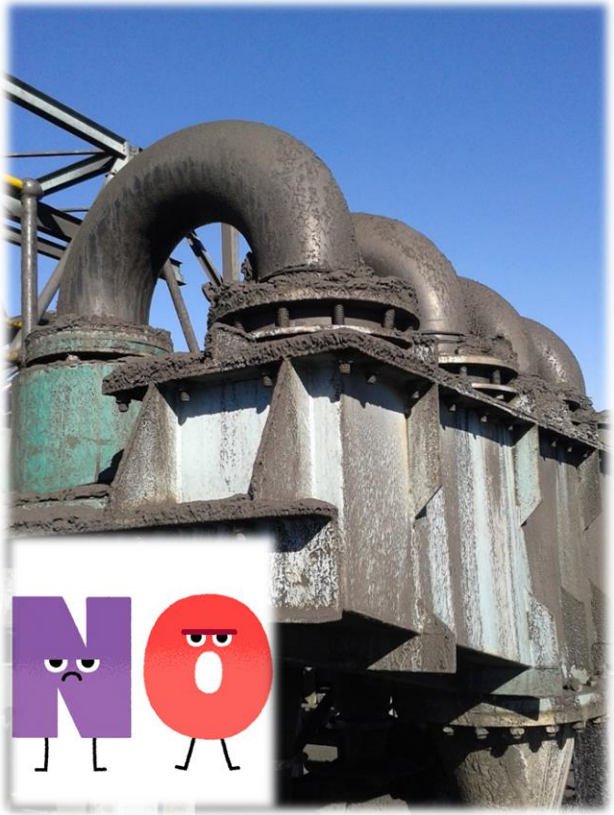


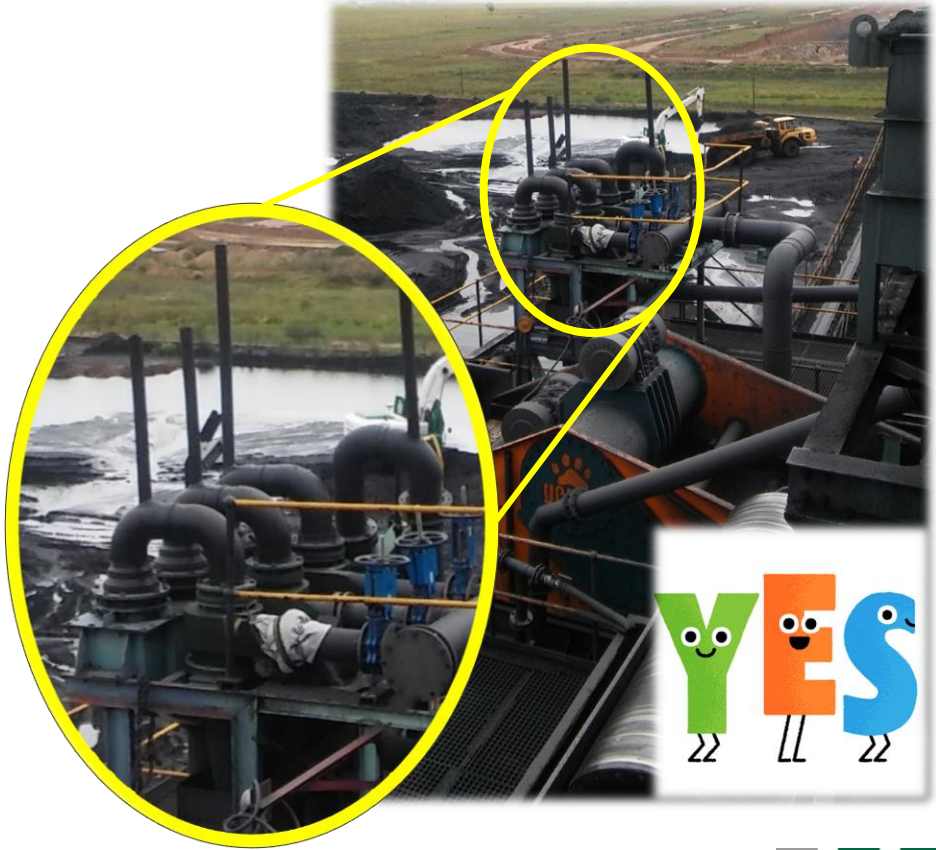




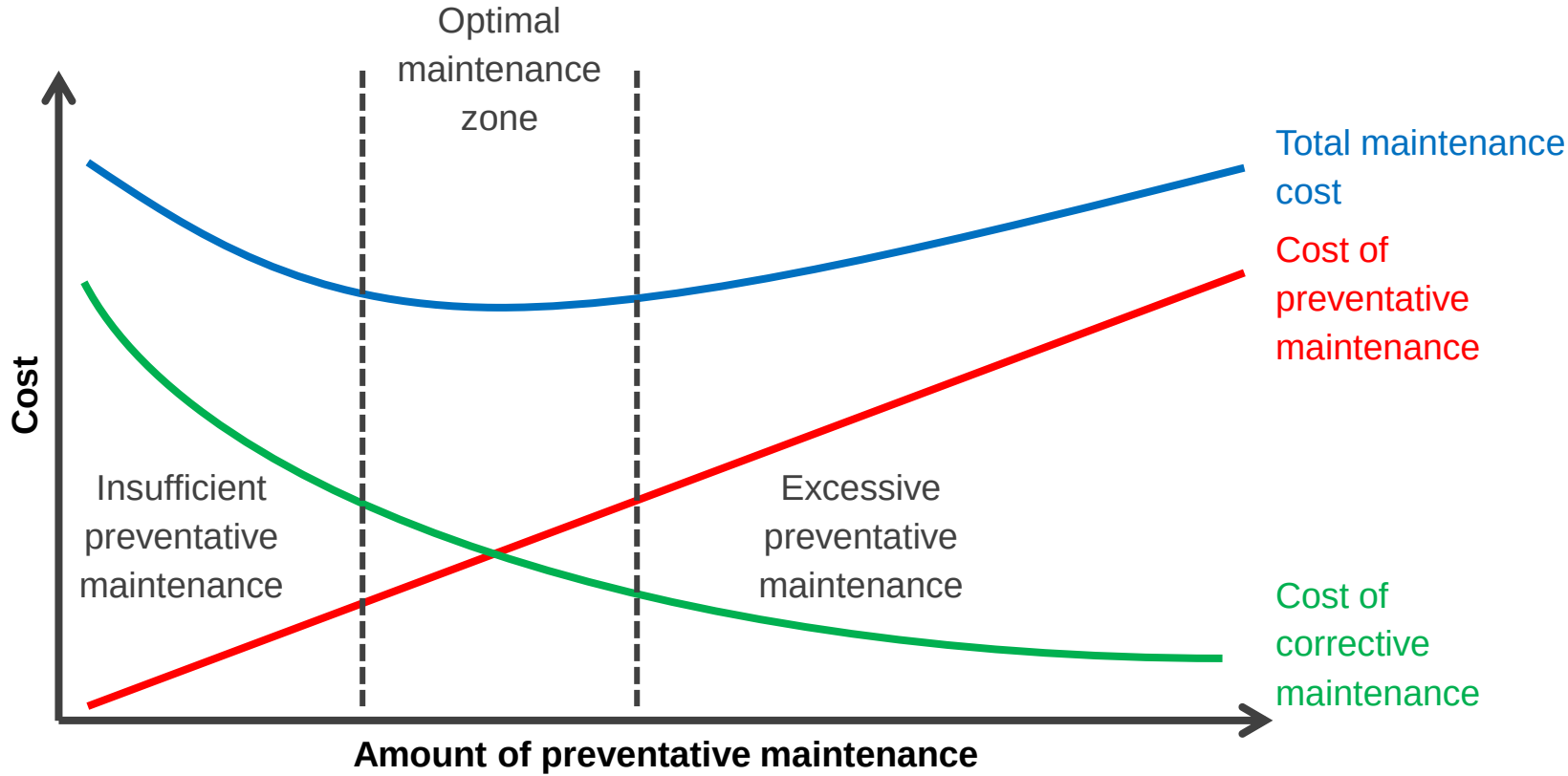


Minimise coarse particle misplacement





Maintenance



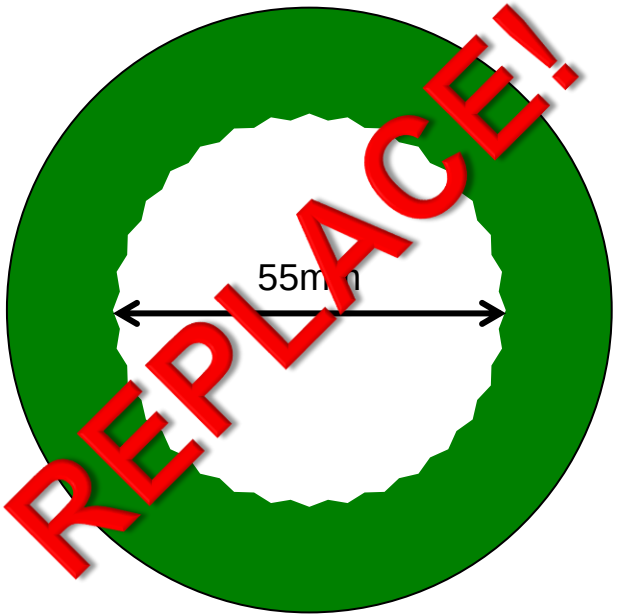
Maintenance

Allowed spigot wear – 10%

Original spigot size: 50mm

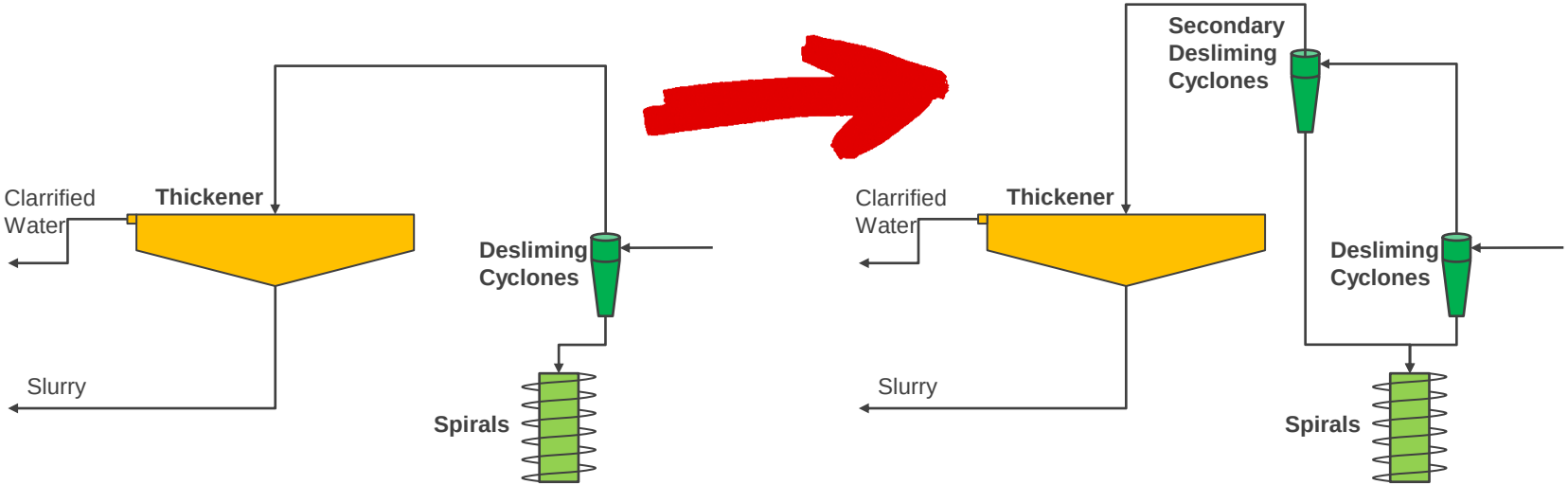
Allowed wear: 10% x 50mm
= 5mm

Change size: 50mm + 5mm
= 55mm



New / fresh thinking around the fines circuit

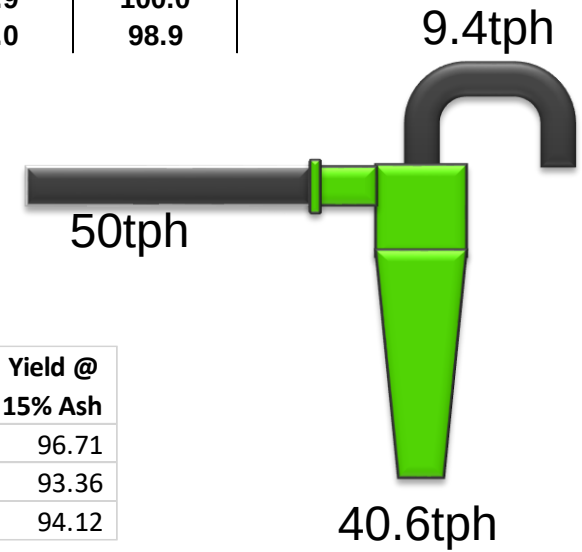
What if we attempt to recover the misplaced particles in the desliming cyclone's overflow with a secondary / scavenger cyclone?



New / fresh thinking around the fines circuit

Particle Size Distribution:

Size Microns	Cumulative % Passing		
	Feed	Underflow	Overflow
3000	100.0	100.0	100.0
1000	100.0	100.0	100.0
500	56.4	46.3	100.0
212	39.0	24.9	100.0
150	36.4	22.0	98.9



Size fraction	Ash %	Yield @ 15% Ash
-1; +0.5mm	16.53	96.71
-0.5; +0.212mm	18.61	93.36
-0.212; +0.150mm	18.33	94.12

-212; +150mm in O/F
= 100 – 98.9 = 1.1%

9.4tph x 1.1% =0.1tph

94% is < 15% Ash
→ 94% x 0.1tph
= 0.09tph potential export product

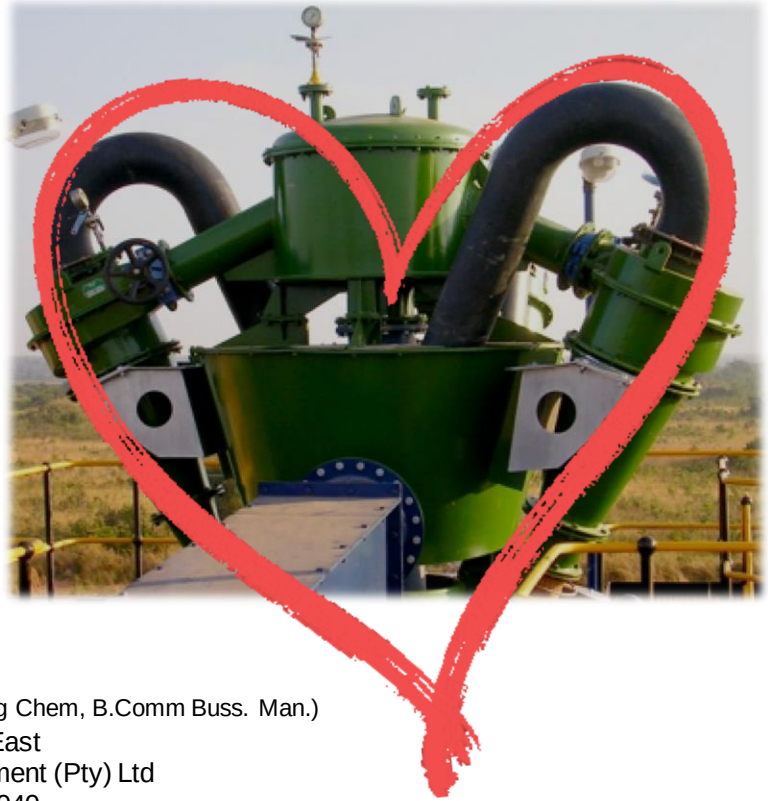
@ R4,400 per ton (May'22)
≈ R400/hr potential revenue

Final thought

Cyclones (whether DMS or hydrocyclones) are at the heart of our conventional coal processing plants.

If you take care of them, they will return the favour.

If you don't know or are unsure how to take care of your plant's heart…
Make an appointment with the **doctors**!



Wink, wink, nudge, nudge

MULTOTEC

Frikkie Enslin (B.Eng Chem, B.Comm Buss. Man.)
Applications Manager - East
Multotec Process Equipment (Pty) Ltd
Mobile: +27 (0) 82 772 1940
Email: frikkiee@multotec.com
www.multotec.com

Process Equipment

Whether your process equipment are naughty or nice, you can always count on Multotec for the best advice!