



Mill Axial Test · where the mill stops grinding

The residue profile along the mill, the dead and slow stretches, and the ball size every metre asks for.

Licensed to: Sample file · worked example on a demonstration plant

DEAD OR SLOW STRETCHES	COARSE WORK IN CHAMBER 1
1 dead · 0 slow	94 % · healthy above 92

COARSE JOB FINISHED AT	BALL NEEDED AT THE DIAPHRAGM
3.97 m from the inlet	29 mm

YOUR FIGURES

	Today		
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The mill

Mill diameter inside the liners	3.81		m
Mill speed	16.20		rpm
First chamber length (inlet to diaphragm)	3.81		m
Second chamber length	7.62		m

For the ball size

Bond work index of the feed	13.5		kWh/t
Specific gravity of the feed	3.15		
Grinding	Dry		
Media	Balls		

The balls carried (from the charge sheet)

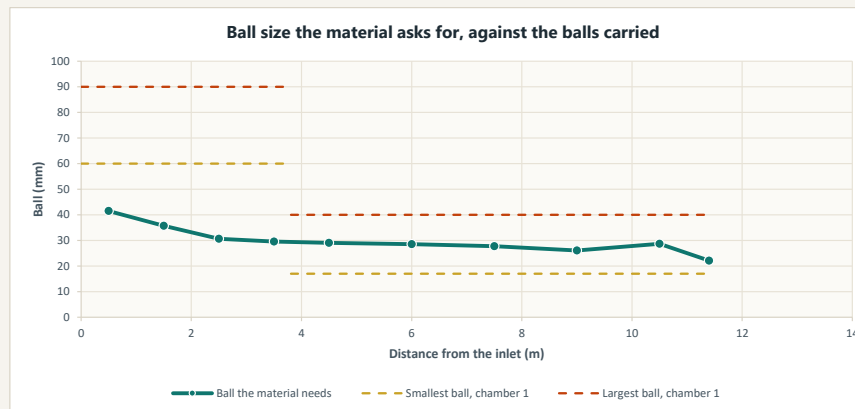
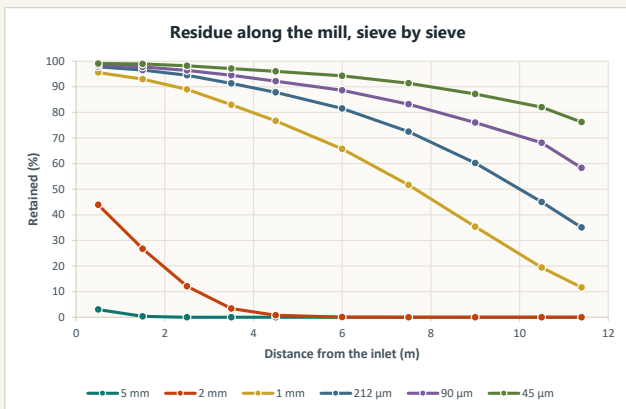
First chamber, smallest ball (optional)	60		mm
First chamber, largest ball (optional)	90		mm
Second chamber, smallest ball (optional)	17		mm
Second chamber, largest ball (optional)	40		mm

The samples go on the Samples sheet (the tab next to this one).

Yellow cells are yours. Everything else is worked out as you type.

RESULTS

	Today				What it means
Sampling points used	10				
Length sampled (m)	10.90				
Dead stretches	1	ACT			A stretch grinding at under half the pace of both neighbours, or flat while 10 points or more still have to come off.
Slow stretches	0				Under three quarters of the pace of both neighbours.
Coarse work done in the first chamber (%)	94	GOOD			The coarse job belongs before the diaphragm: above 92 % is healthy.
Fine work done in the second chamber (%)	83				
Coarse job finished at (m)	3.97	GOOD			Compared with the diaphragm position (the first chamber length).
Half the fine work done by (m)	7.30				Follow it test to test: drifting down the mill is wear showing early.
Biggest distance between two samples (m)	1.50				
Sieve and sampling faults	0	GOOD			
Ball the material needs at the inlet (mm)	41				
Ball needed at the diaphragm (mm)	29				
Ball needed at the outlet (mm)	22				
First chamber: smallest ball against need (mm)	31	WATCH			Positive: the smallest ball carried is bigger than the material needs there.
Second chamber: smallest ball against need (mm)	-5	WATCH			



WHAT TO DO FIRST

ACT

DEAD 0.5 – 1.5 m

The 45 µm residue barely moves across this stretch (0.20 points per metre) although 22.9 points still have to come off. Material passes through and nothing happens to it.

Do: Open the manhole at that distance; check the ball level and whether the top size has worn away there; check the lifting liners are still lifting and not worn flat.

Why: A metre of mill that is not grinding is still a metre of shell, liners and steel paid to turn. It is the cheapest ton per hour there is to buy back.

GOOD

THE COARSE JOB

The 2 mm work is finished by 3.97 m, within 0.2 m of the diaphragm at 3.81 m. The first chamber does its job and hands over clean.

Do: Nothing to change.

Why: When the coarse job finishes before the wall, the second chamber spends all its surface on making fineness.

GOOD

THE DIAPHRAGM

The first chamber does 94 % of the 2 mm work: the coarse job is finished before the wall, which is exactly what the first chamber is for.

Do: Nothing to change here.

Why: Coarse material reaching the second chamber is not broken there: the small balls cannot do it.

READ

WHERE THE FINE WORK IS

Half of all the 1 mm material this mill removes is gone by 7.30 m, 64 % of the way down.

Do: Compare this number test to test, not against a textbook.

Why: It drifting further down the mill over the months is wear seen long before it costs tons.

WATCH

BALLS TOO COARSE · FIRST CHAMBER

From 0.5 m to 3.5 m the material is finer than anything carried there. At 3.5 m it only needs 30 mm balls, and the smallest ball in the chamber is 60 mm: 30 mm bigger than the job needs (4 sampling point(s)).

Do: Shift the next top-ups in this chamber towards 30 mm and below; check the classifying liners are still sorting the charge along the mill.

Why: Big balls have very little surface for their weight. Where the material is already fine they carry weight and amps without making fineness.

GOOD

THE CHARGE LEVEL

Where measured, the filling is 33.6 %: inside the normal band.

Do: Log it with the date beside the sieve sheet.

Why: A charge level recorded next to a residue profile is what tells a worn liner from a light charge next time.

WATCH

WHAT WAS NOT MEASURED

The ball level was measured at 2 of 10 points, so over- or under-charging cannot be judged anywhere else. Nothing is guessed in between.

Do: At the next crash stop, take the ball level at every manhole that can be reached.

Why: Sieve results show where the mill is not grinding. Only the ball level shows whether the reason is the charge.