



Ball Mill Volume Loading - how full is the mill

Filling, tonnes of balls, and exactly how much to add or take out to reach the target, chamber by chamber.

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

TO ADD (+) OR TAKE OUT (-)	FILLING, FIRST CHAMBER
-16.8 t, both chambers	31.1 % of the volume

FILLING, SECOND CHAMBER	BALLS IN THE MILL
33.6 % of the volume	196.7 t

YOUR FIGURES

	Today	What if	
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The mill

Mill diameter inside the liners	3.81		m
How the mill was stopped	Ground out		
Material lying on the balls (crash stop)	0		mm

First chamber

Length	3.81		m
Free height (tape, liner top to balls)	2480		mm
Bulk weight of the balls	4.50		t/m³
Target filling	30.0	32.0	%

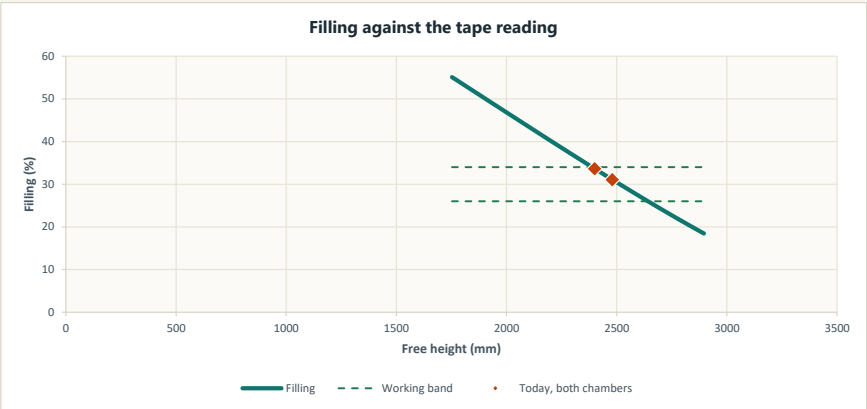
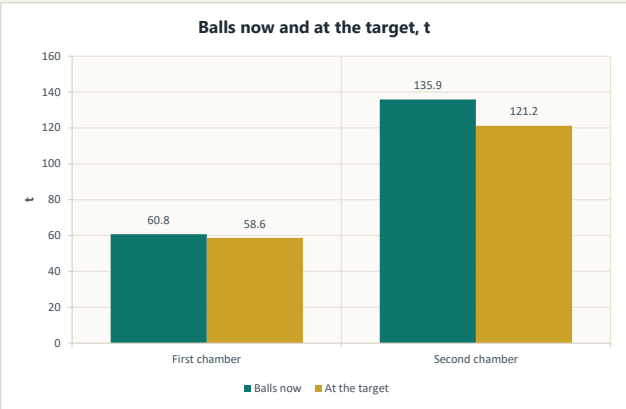
Second chamber

Length	7.62		m
Free height (tape)	2400		mm
Bulk weight of the balls	4.65		t/m³
Target filling	30.0	32.0	%

Yellow cells are yours. Leave a What-if cell empty to keep today's figure; type a new one to see what changes, before anything is changed in the plant.

RESULTS

	Today		What if	Change	What it means
Filling, first chamber (%)	31.1	GOOD	31.1	0	26 to 34 % is the working band of a cement mill; below 22 or above 38 % costs output and wear.
Balls now, first chamber (t)	60.8		60.8	0	
Balls at the target, first chamber (t)	58.6		62.5	+3.9	
To add (+) or take out (-), first (t)	-2.1		1.8	+3.9	
Tape reading at the target, first (mm)	2,514		2,451	-63	Check the reading after the top-up: it proves the tonnes really went in.
Tonnes per 10 mm of tape, first (t)	0.62		0.62	0	
Filling, second chamber (%)	33.6	GOOD	33.6	0	
Balls now, second chamber (t)	135.9		135.9	0	
Balls at the target, second chamber (t)	121.2		129.3	+8.1	
To add (+) or take out (-), second (t)	-14.7		-6.6	+8.1	
Tape reading at the target, second (mm)	2,514		2,451	-63	
Tonnes per 10 mm of tape, second (t)	1.30		1.30	0	
Balls in the mill (t)	196.7		196.7	0	
To add (+) or take out (-), total (t)	-16.8		-4.9	+12.0	



WHAT TO DO FIRST

WATCH	FIRST CHAMBER · ABOVE TARGET At 31.1 % this chamber is above the 30 % target. Do: Take out 2.1 t; the tape should then read about 2,514 mm. <i>Why: Carrying more steel than the target costs power without extra output.</i>
WATCH	SECOND CHAMBER · ABOVE TARGET At 33.6 % this chamber is above the 30 % target. Do: Take out 14.7 t; the tape should then read about 2,514 mm. <i>Why: Carrying more steel than the target costs power without extra output.</i>
READ	HOW GOOD IS ONE READING A 50 mm difference in where the tape sits moves the answer by about 1.59 points in the first chamber and 1.61 in the second. Do: Take three readings along each chamber and average them; always measure at the same spots. <i>Why: It settles the usual argument about whether one reading is good enough.</i>

