



Ball Charge Design and Check · is the charge still right

Average ball, grinding surface and filling of each chamber, the records checked against the tape, and a planned top-up tested before it is made.

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

AVERAGE BALL, FIRST CHAMBER	SURFACE, SECOND CHAMBER
1.620	30.2
kg · band 1.35 to 1.65	m²/t · band 28 to 33

YOUR FIGURES

	Today	What if	
--	-------	---------	--

The mill

Mill diameter inside the liners	3.81		m
Density of the steel	7,700		kg/m³

First chamber

Length	3.81		m
Bulk weight of the balls	4.50		t/m³
Free height (tape), to check the records (optional)	2470		mm

Second chamber

Length	7.62		m
Bulk weight of the balls	4.65		t/m³
Free height (tape), to check the records (optional)	2400		mm

First chamber · tonnes of each ball size, largest first

Ball size (mm)	Today (t)	What if (t)	
100	7.90		t
90	13.16		t
80	15.79	9.00	t
70	15.79		t
60	13.16		t

Second chamber · tonnes of each ball size, largest first

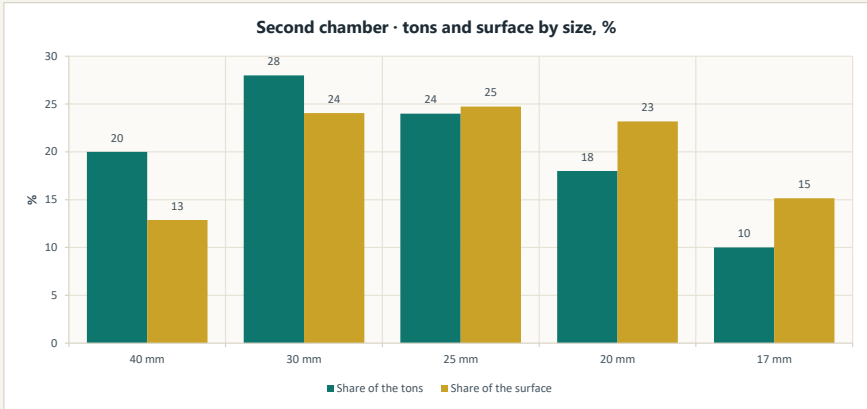
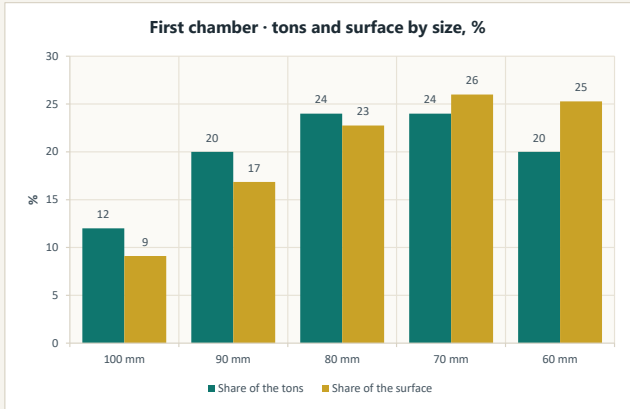
Ball size (mm)	Today (t)	What if (t)	
40	27.18		t
30	38.05	41.00	t
25	32.62		t
20	24.46		t
17	13.59		t

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.

BALLS IN THE MILL	RECORDS AGAINST TAPE
201.7	4.4
t	t

RESULTS

	Today		What if	Change	What it means
Average ball weight, first chamber (kg)	1.620	GOOD	1.581	-0.039	A finish mill first chamber runs 1.35 to 1.65 kg.
Average ball size, first chamber (mm)	73.8		73.2	-0.6	
Grinding surface, first chamber (m²/t)	10.3		10.3	+0.1	
Filling, first chamber (%)	33.7	GOOD	30.2	-3.5	From the tonnes recorded, the chamber and the bulk weight.
Tape reading for this charge, first (mm)	2,399		2,508	+109	
Average ball weight, second chamber (kg)	0.056		0.057	+0.001	
Grinding surface, second chamber (m²/t)	30.2	GOOD	30.2	-0.1	A finishing chamber reaches 28 to 33 m² per ton.
Filling, second chamber (%)	33.6	GOOD	34.4	+0.7	
Tape reading for this charge, second (mm)	2,400		2,378	-23	
Balls in the mill (t)	201.7		197.9	-3.8	
Grinding surface in the mill (m²)	4,786		4,797	+10	
Records against tape (t)	4.4	GOOD	0.6	-3.8	Positive: the records show more steel than the tape finds (unrecorded wear).



WHAT TO DO FIRST

GOOD	FIRST CHAMBER · RIGHT
	The average ball weighs 1.620 kg, inside the 1.35 to 1.65 kg band. The size mix is right for a finish mill first chamber.
	Do: Record this grading with the date and the tape reading beside it. Why: A charge sheet with dates is the only way to see how fast steel is lost.
GOOD	SECOND CHAMBER · RIGHT
	This charge gives 30.2 m ² of surface per ton, inside the 28 to 33 band: a properly graded finishing charge.
	Do: Keep the top-up sizes as they are and re-check after the next axial test. Why: Specific surface is what actually produces Blaine, and this charge has the right amount of it.
READ	THE TWO TOGETHER
	The second chamber carries 2.9 times as much grinding surface per ton as the first, and holds 86 % of all the surface in the mill.
	Do: Read that against the axial test: the surface split should follow where the work is done. Why: The first chamber breaks, the second finishes. If the surface is not concentrated in the second chamber, the mill is set up to crush rather than to grind.
GOOD	RECORDS AGAINST TAPE
	Records and tape agree to within 4.4 t.
	Do: Log both numbers today: the difference between two such checks months apart is the wear rate in tons per month. Why: Once records and tape agree, the paper can be trusted between shutdowns.
