



Max Ball Size · the top ball the feed needs

The largest ball the first chamber needs to break its feed, rounded to a size that can be bought.

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

TOP BALL TO CHARGE	SIZE THE FEED NEEDS
110 mm	100.4 mm

YOUR FIGURES

	Today	What if	
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The mill

Mill diameter inside the liners	3.81		m
Mill speed	16.20		rpm
Grinding	Dry		
Media	Balls		

The feed

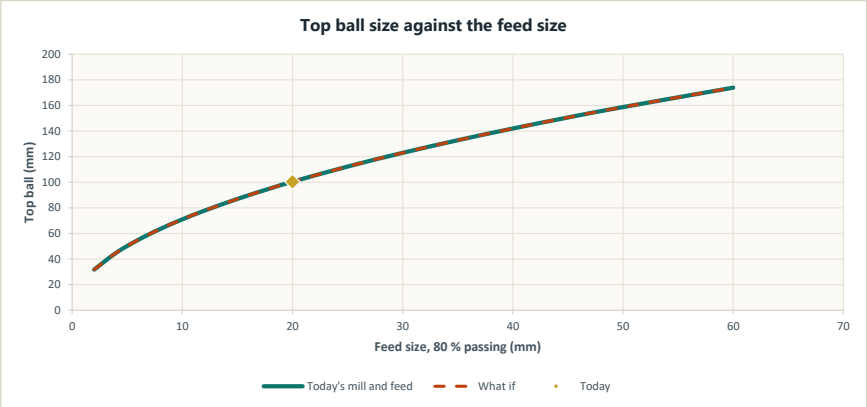
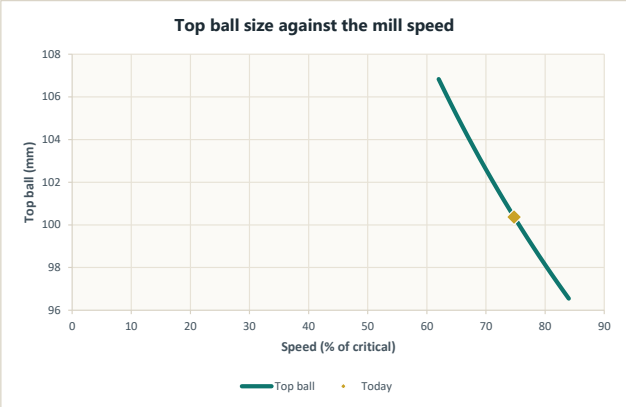
Feed size, 80 % passing	20.0	30.0	mm
Bond work index of the feed	13.5		kWh/t
Specific gravity of the feed	3.15		

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.

BALL AGAINST LUMP	SPEED
5.5 : 1	74.8 % of critical

RESULTS

	Today		What if	Change	What it means
Top ball to charge (mm)	110	GOOD	120	+10	The nearest size that can be bought at or above what the feed needs.
Size the feed needs (mm)	100.4		122.9	+22.6	Bond's top ball size; below 25 mm the published 1.3 correction is applied.
If the feed were 50 % coarser (mm)	122.9		150.6	+27.6	Ball size follows the square root of the feed size: it moves far less than the feed.
Ball against the feed lump (: 1)	5.5	GOOD	4.0	-1.5	Below 3 : 1 lumps tend to be pushed aside rather than broken.
Speed against critical (%)	74.8	GOOD	74.8	0	Cement mills run 70 to 78 % of critical.
Critical speed (rpm)	21.67		21.67	0	
Mill factor K	355		355	0	
Shape factor A	20.17		20.17	0	



WHAT TO DO FIRST

GOOD	BALL SIZE Bond puts the top ball at 100.4 mm for a 20 mm feed at 74.8 % of critical speed. The nearest size that can be bought at or above that is 110 mm. Do: Charge 110 mm as the top size; keep the rest of the grading below it; re-check whenever the feed gets coarser. <i>Why: The top ball only has to break the coarsest lumps. Everything finer is handled by the smaller sizes below it.</i>
READ	IF THE FEED CHANGES Ball size follows the square root of the feed size. If the feed got 50 % coarser, from 20 to 30 mm, the ball would only need to go from 100.4 to 122.9 mm. Do: Do not re-size the charge over a short crusher upset; re-check only if the coarse feed stays for weeks. <i>Why: Changing the top ball size takes weeks to show in the product, so it is the wrong answer to a problem that lasts days.</i>

