Mill Roller Wear and Life (Hugot)

Diameter lost by a mill roller over a season from a wear rate per 100 000 t cane, and the seasons until it reaches the wear limit as a share of its diameter.

Method: Hugot; Handbook of Cane Sugar Engineering; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
New roller diameter (mean)	0.91400	m
Wear rate on the diameter per 100 000 t cane Hugot (Réunion): feed 2.1, top 3.1, delivery 2.9 mm; Tromp 6.5–13 mm for all rollers.	3.1000	mm
Cane crushed per season	600,000	t
Allowed wear as a share of the diameter Hugot: 4–5 % classically, up to 10 % in modern practice.	5.0000	%

Calculated results

Parameter	Value	Unit
Diameter lost per season	18.600	mm
Diameter at the end of the season	895.40	mm
Seasons to the wear limit	2.4570	

Notes for this case

- Rollers in one mill should stay within about 3 % of each other in diameter (Java practice).

Formula and method

$$\Delta D = w\,\frac{C}{10^5\ \mathrm{t}},\quad D_e = D - \Delta D,\quad n_s = \frac{\delta D}{\Delta D}$$

Variables

D	New roller diameter (mean)	m
w	Wear rate on the diameter per 100 000 t cane	m
C	Cane crushed per season	kg
δ	Allowed wear as a share of the diameter	-
ΔD	Diameter lost per season	m
D_e	Diameter at the end of the season	m
n_s	Seasons to the wear limit	-

Method and standards

Linear wear with tonnage.

Assumptions and limits

- Wear proportional to cane crushed. A season wear above the allowed wear is flagged, and wear larger than the roller itself is rejected.

References

- Hugot
- Handbook of Cane Sugar Engineering
- 3rd ed. (Elsevier, 1986)
- ch. 9
- roller wear
- pp. 113–115

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/sugar-ethanol/milling/mill-roller-wear

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.