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TECHNICAL GUIDES

Cone Crusher CSS Setting: Master Closed-Side Setting for Optimal Product Gradation

Set cone crusher CSS correctly for target gradation. Measurement methods, adjustment procedures, and gradation prediction for secondary and tertiary crushing.

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Closed Side Setting (CSS) is the single most important operating parameter in cone crushing—it determines product size, throughput, power consumption, and liner wear. Yet many operators treat CSS as a set-and-forget parameter when in reality it requires regular verification and adjustment to maintain optimal performance. This guide provides complete CSS management protocols from initial setting through ongoing monitoring and adjustment.

Understanding CSS Fundamentals

What CSS Controls

OUTPUT CHARACTERISTIC	EFFECT OF TIGHTER CSS	EFFECT OF WIDER CSS
Product P80	Finer (smaller)	Coarser (larger)

OUTPUT CHARACTERISTIC	EFFECT OF TIGHTER CSS	EFFECT OF WIDER CSS
Throughput	Reduced capacity	Increased capacity
Power draw	Higher kWh/tonne	Lower kWh/tonne
Liner wear	Accelerated wear	Reduced wear
Product shape	Better cubicity	More elongated
Recirculation load	Lower (less oversize)	Higher (more oversize)

CSS Measurement Methods

METHOD	ACCURACY	EQUIPMENT	PROCEDURE
Lead balls	±2mm	Lead balls (various sizes)	Drop through chamber, measure compressed balls
CSS gauge	±1mm	Manufacturer-specific gauge	Insert at multiple points, average readings
Zeroing + calculation	±3mm	Position indicator	Zero at touch, add hydraulic lift distance
Product size analysis	Indirect	Sieve analysis	P80 ≈ CSS + 10-15%

CSS Setting Guidelines

By Application

APPLICATION	TYPICAL CSS RANGE	RATIONALE
Secondary crushing (coarse)	25-50mm	Capacity priority, further reduction downstream
Secondary crushing (fine)	15-25mm	Direct to screen, minimize tertiary load
Tertiary crushing	10-20mm	Final size reduction before screening
M-sand production	8-15mm	Maximize fines generation

Minimum CSS by Crusher Size

CONE DIAMETER	MINIMUM PRACTICAL CSS	REASON FOR LIMIT
36" (900mm)	10mm	Packing, heat, throughput
48" (1200mm)	13mm	Hydraulic relief, liner stress
52" (1300mm)	16mm	Power consumption limits
60" (1500mm)	19mm	Maximum designed reduction

CSS Adjustment Procedure

Hydraulic Adjustment System

1. Stop feed to crusher; allow chamber to empty
2. Record current CSS setting and position indicator reading
3. Activate hydraulic adjustment (raise/lower bowl)
4. Move in small increments (2-3mm maximum per adjustment)
5. Verify new CSS with measurement method
6. Document new setting
7. Resume feeding at reduced rate initially
8. Monitor power draw and product size

Wedge/Shim Adjustment System

1. Lock out power and hydraulic systems
2. Access wedge adjustment mechanism
3. Loosen adjustment bolts
4. Reposition wedges per required CSS change
5. Retighten bolts to specification
6. Measure CSS at multiple points
7. Verify uniformity around circumference

CSS Monitoring and Correction

Why CSS Changes During Operation

CAUSE	EFFECT ON CSS	RATE OF CHANGE
Liner wear	Opens CSS gradually	1-2mm per 10,000 tonnes
Thermal expansion	Closes CSS when hot	2-5mm from cold to operating
Hydraulic pressure loss	Opens CSS	Sudden if relief valve trips
Backing compound settling	Opens CSS	Most in first 1000 tonnes

Monitoring Schedule

CHECK	FREQUENCY	ACTION IF DEVIATION
Product size verification	Every shift	Adjust CSS if P80 > target + 3mm
CSS measurement	Weekly	Document and adjust as needed
Full circumference check	Monthly	Investigate if variance > 3mm
Liner wear measurement	Monthly	Predict CSS compensation needed

Optimization Strategy

Finding Optimal CSS

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Start with: CSS = Target P80 × 0.85

Test and adjust:
- If P80 > target: tighten CSS by 2mm
- If P80 < target with good capacity: consider opening CSS
- Monitor power consumption—should be 70-85% of motor rating
- Check recirculation load (target 15-30% of new feed)
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Balancing Factors

PRIORITY	CSS STRATEGY	TRADE-OFF
Maximum capacity	Open to limit power	Coarser product, more recirc
Product specification	Set for P80 target	Capacity may be limited
Minimum liner wear	Open as far as acceptable	May need more tertiary work
Best product shape	Tighter CSS with higher recirc	Lower throughput

Conclusion

CSS management is fundamental to cone crusher optimization. Measure CSS regularly using consistent methods, adjust systematically when product requirements change or liners wear, and document settings for trend analysis. The time invested in proper CSS management returns through consistent product quality, optimized throughput, and predictable liner life. Don't treat CSS as a mystery—it's a precise, measurable parameter that responds predictably to adjustment.

Topics: #CSS Setting #Cone Crusher #Crushing #Gradation

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