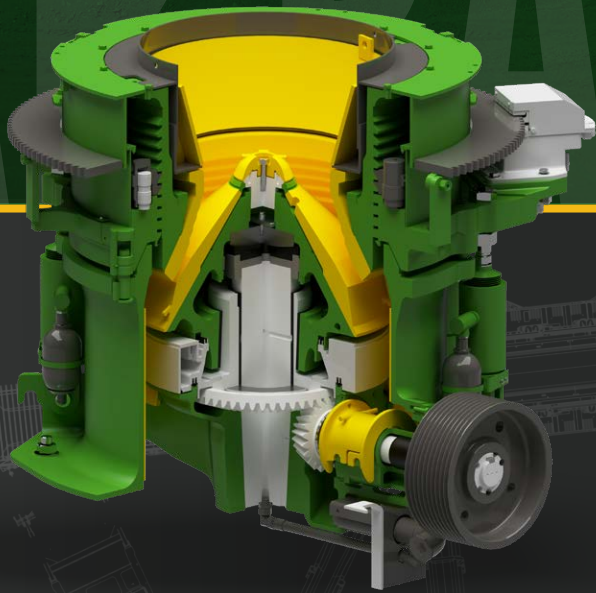


CONE CRUSHER WEAR PARTS SELECTION GUIDE

WEAR PARTS



MPP
AFTERMARKET

McCloskey[®]
INTERNATIONAL

MPP

AFTERMARKET

At MPP Aftermarket, we understand that every second of downtime impacts your bottom line. That is why we deliver premium wear parts for cone crushers with precision, reliability and speed. Our global parts inventory, supported by factory-trained technical and on-call support teams, means you get the right component exactly when you need it.

Whether you are replacing liners, cheek plates, toggle assemblies or complete wear-kits, choosing the correct material grade and geometry is critical to maximise throughput and minimise unplanned maintenance. Industry leaders highlight that well-engineered wear parts help avoid costly stoppages, extend service life and stabilise crushing performance.

Partnering with MPP Aftermarket ensures your operations remain productive and profitable. Our promise is simple: uptime delivered.

CONE CRUSHERS

MAXIMIZING PERFORMANCE THROUGH THE RIGHT WEAR CHOICES

Cone crushers are essential machines in aggregate and mining operations, using compressive force to reduce rock size efficiently.

Material is fed into the top of the crusher and crushed between a gyrating mantle and a stationary bowl liner. This action breaks down rock through direct compression and inter-particle crushing, producing a consistent product while minimizing wear.

Understanding this crushing process is the first step in selecting the right wear parts for your application, this guide will help you make informed choices for better performance and longer wear life.



“THE QUALITY AND STANDARD IS HIGHER THAN WHAT YOU WOULD GET IN THE LOCAL MARKET, AND THAT SETS US APART IN THIS INDUSTRY.”

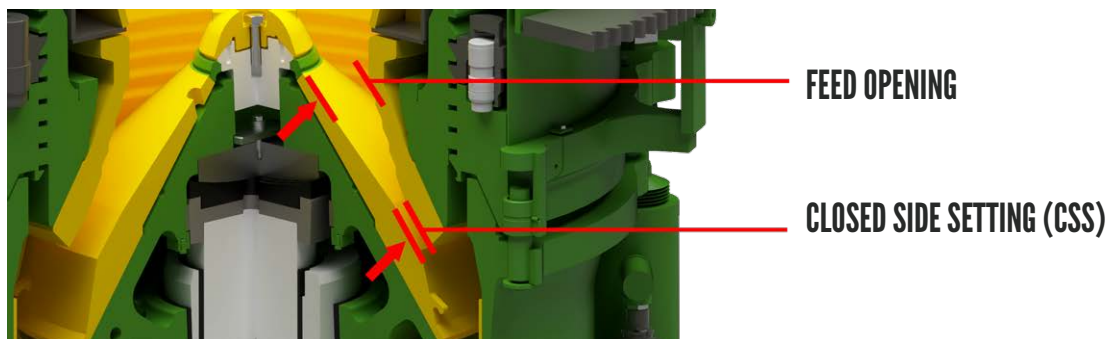
– KANU EQUIPMENT, SOUTH AFRICA

SCAN TO DISCOVER HOW MPP AFTERMARKET IS EMPOWERING KANU EQUIPMENT TO DELIVER INDUSTRY LEADING CUSTOMER SERVICE:



KEY PARAMETERS AND TERMINOLOGY

BASIC CONCEPTS OF CONE CRUSHING



CLOSED-SIDE SETTING (CSS)

CSS is the smallest gap between the mantle and bowl liner during the gyrating cycle. CSS directly controls the final product size and defines the reduction ratio of the crusher. It is measured from the bottom of the mantle to the bowl liner at their closest point.

A tighter CSS yields finer product but lower throughput, whereas a larger CSS allows more throughput but coarser output.

FEED OPENING

Feed opening refers to the area through which feed material enters the crushing chamber. The open-side feed opening is the distance between mantle and bowl when they are farthest apart, and the closed-side feed opening is the distance at their closest point. The feed opening governs the maximum size of feed that the cone crusher can accept.

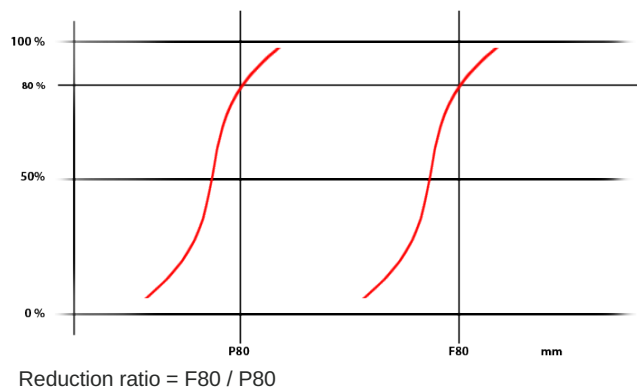
NIP ANGLE

Nip Angle is the angle between the mantle and bowl liner surfaces. A proper nip angle helps grip the rock. If the nip angle is too large, rock may slip upward rather than being crushed, leading to reduced capacity and accelerated wear. An excessive nip angle is observed as “bouncing” or “boiling” of feed in the chamber, indicating the cone crusher is not effectively biting the material.



REDUCTION RATIO

Reduction Ratio refers to the ratio of the incoming feed size to the crusher’s output size (often measured at the 80% passing metric or P80). In cone crushers the reduction ratio typically ranges from about 4:1 to 6:1 in one pass. Coarser chamber liners can sometimes achieve a higher reduction in secondary applications, while finer liners operate in the lower end of the range.



OPERATIONAL TIPS

FOR MCCLOSKEY CONE CRUSHERS

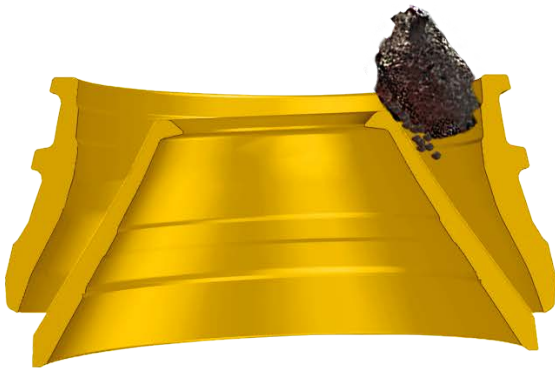
Proper operation and maintenance of a cone crusher are essential to maximize productivity, ensure consistent output, and extend wear part life. Follow these key tips to keep your McCloskey crusher running efficiently and avoid unnecessary downtime.

FEED GRADATION AND CHOKE FEEDING

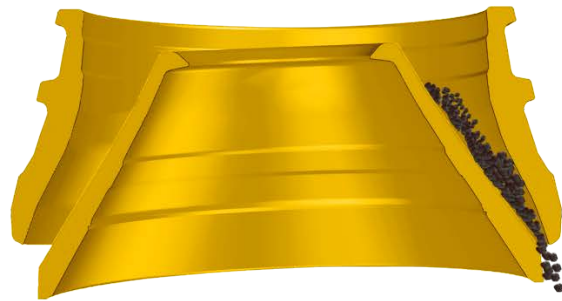
Always ensure the feed is well-graded (mix of sizes) and choke fed into the cone. Choke feeding means maintaining a full chamber of material; the feed should cover the mantle and be distributed 360° around it.

This promotes inter-particle rock crushing and prevents air pockets, yielding better product shape and liner utilization. Avoid feeding oversize material that exceeds the cone's recommended max feed size, and screen out excessive fines prior to crushing.

Ideally, no more than about 10–15% of the feed should be smaller than the CSS – higher fine fractions can cause packing and high pressure leading to ring bounce and pre-mature crusher failures. Conversely, too large a feed or chunks can lead to clogging or excessive wear.



TOO BIG



TOO SMALL

UNIFORM FEED DISTRIBUTION

Ensure the material is distributed evenly around the inlet of the cone. Segregated feeding (e.g. only one side of the crusher receiving the coarse rock and the other side fine rock) leads to uneven liner wear, cyclic imbalances in power draw, and potential mechanical stress.

An off-center or one-sided feed can cause one side of the crusher to wear out much faster than the other, and often triggers ring bounce and poor product shape. Use a feed hopper or distributor so that material falls evenly into the chamber. If you observe uneven wear patterns on the mantle or bowl (one side more worn), it's a sign that feed distribution is suboptimal and needs correction.



MONITOR POWER DRAW

Power draw or the load on the crusher's drive motor, is a critical operational indicator. For optimum efficiency, the cone crusher should operate at a steady, near-maximum power draw. Monitor the amperage to maintain consistent power close to the crusher's rated capacity without overloading.

- A stable, high power draw indicates the crusher is fully utilized with proper choke feed.
- Low or fluctuating power suggests an incomplete chamber fill or inconsistent feeding.
- Sudden power drops may indicate a near-empty chamber or bridging
- Spikes suggest uncrushable material or packing.

OPTIMAL CRUSHER SPEED

McCloskey cone crushers allow variable drive speeds, which directly influence product shape and gradation. In general, higher RPMs produce a finer product and improved particle shape but may also increase liner wear.

Operators should be aware that it's essential to stay within the recommended speed range to prevent potential machine damage. That said, a higher speed results in finer output and more cubic shape due to increased inter-particle crushing, while a lower speed increases throughput and yields a coarser product with reduced fines.

MAINTAIN THE PROPER CSS AND PREVENT RING BOUNCE

Set the CSS appropriately for the desired product, but not so tight that the crusher is overloaded. If the CSS is too small for the given feed conditions, you may observe the adjustment ring or upper frame "bouncing" on the main frame – this phenomenon is called ring bounce, and it's a clear sign the crusher is being overloaded or forced beyond its design limit.

Ring bounce is essentially the bowl lifting and then settling repeatedly due to excessive pressure under the mantle. It can be triggered by too-tight CSS, too much fines, or a surge of uncrushable material. If ring bounce occurs, open the CSS slightly to reduce pressure, or improve the feed conditions (remove some fines, ensure choke feed). Continuous ring bounce will damage the crusher, so it should be addressed immediately, spikes could indicate uncrushable material or packing.

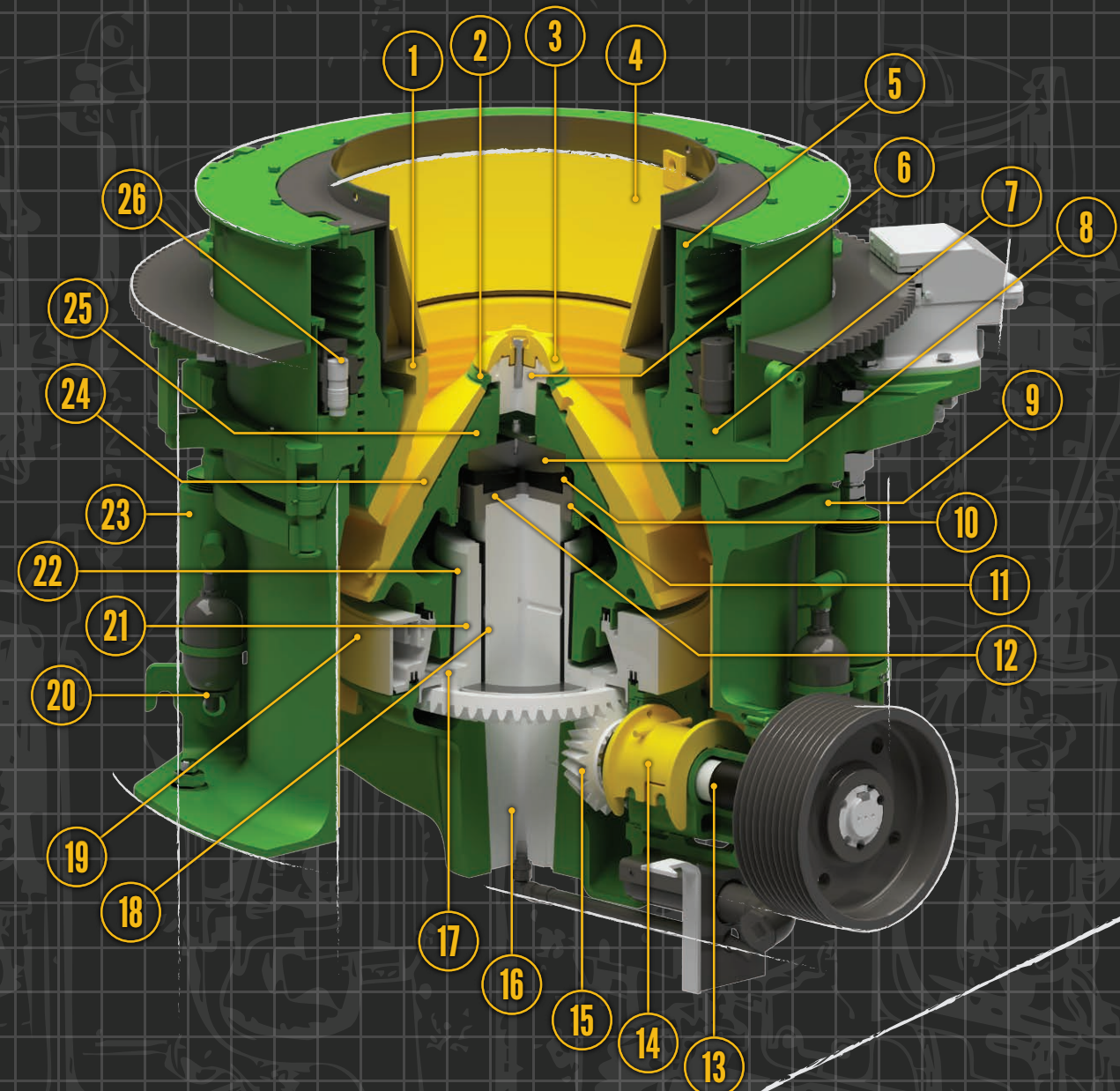
WATCH AND LISTEN

Train operators to identify unusual noises or vibrations that signal feeding issues or component wear. Screeching or grinding suggests worn bearings, while thumping indicates segregated feed or bouncing. Monitor hydraulic pressure on crushers equipped with hydraulic adjustment or tramp release systems—consistently elevated pressure signals packing or liner wear approaching end of life.



CONE CRUSHER COMPONENTS

- 1 BOWL LINER
- 2 TORCH RING
- 3 FEED CONE
- 4 FEED HOPPER
- 5 BOWL
- 6 HEAD BOLT
- 7 ADJUSTMENT RING
- 8 HEAD BALL
- 9 MAIN FRAME
- 10 SOCKET LINER
- 11 UPPER HEAD BUSHING
- 12 SOCKET
- 13 COUNTERSHAFT
- 14 COUNTERSHAFT BUSHINGS
- 15 GEAR AND PINION
- 16 MAIN SHAFT
- 17 ECCENTRIC THRUST BEARING
- 18 ECCENTRIC BUSHING
- 19 COUNTERWEIGHT GUARD
- 20 ACCUMULATOR
- 21 ECCENTRIC
- 22 LOWER HEAD BUSHING
- 23 TRAMP RELEASE CYLINDER
- 24 MANTLE
- 25 HEAD
- 26 CLAMPING CYLINDERS



WEAR FACTORS

FEED MATERIAL CLASSIFICATIONS & PROPERTIES

ABRASIVE CLASSIFICATION

Abrasiveness of the feed material can be determined in rock laboratories using a test for abrasiveness. The table (right) indicates the abrasiveness of rock based on this test.

CLASSIFICATION	CRUSHABILITY (%)
Very Easy *	50 +
Easy **	40 - 49
Medium ***	30 - 39
Difficult ****	20 - 29
Very Difficult *****	0 - 19

MATERIAL PROPERTIES

Different materials wear crusher parts differently. Highly abrasive types like basalt need tougher parts, while softer aggregates such as limestone are easier to crush. Understanding abrasiveness and crushability ensures optimal wear part selection.

CLASSIFICATION	FRENCH ABRASIVENESS (G/TON)
Non-Abrasive *	0 - 100
Slightly Abrasive **	101 - 600
Medium Abrasive ***	601 - 1200
Abrasive ****	1201 - 1700
Very Abrasive *****	1701+

CRUSHABILITY CLASSIFICATION

Crushability indicates how easily the rock material breaks down. Harder rock with a low crushability value requires more crushing energy than softer rock with a higher crushability value.

APPLICATION	ABRASIVENESS	CRUSHABILITY
Basalt	500 - 2500 ****	20 - 50 ***
Dolomite	0 - 500 **	30 - 60 **
Granite	900 - 1900 **	30 - 90 *
Gravel	300 - 2500 ***	30 - 55 **
Limestone	0 - 500 **	30 - 65 **
Recycled Concrete	600 - 1200 ***	20 - 50 ***
Recycled Asphalt	1500 - 2400 *****	30 - 50 ***

MANGANESE STEEL COMPOSITION

Manganese steel is the most widely used material for crusher wear parts because it hardens under impact while remaining tough inside—a natural process known as work hardening.

McCloskey offers two high-grade, chromium-alloyed manganese options to match different crushing conditions. Our 18% manganese is the standard all-purpose alloy used across most jaws and cone liners. It delivers excellent value and reliable performance for the majority of aggregate applications, making it the ideal choice for typical quarry and gravel feed materials.

For more demanding conditions, our 22% manganese alloy provides enhanced ductility and deeper work hardening, offering superior wear resistance in very hard or highly abrasive rock. This makes it the preferred option when customers need longer liner life under severe, high-pressure crushing environments.

	DIFFICULT AND ABRASIVE ROCK	DIFFICULT AND NON ABRASIVE ROCK	MEDIUM AND ABRASIVE ROCK	MEDIUM AND NON ABRASIVE ROCK	EASY AND ABRASIVE ROCK	EASY AND NON ABRASIVE ROCK
18% MANGANESE	✓	✓	✓	✓	✓	✓
22% MANGANESE	✓		✓		✓	

CHAMBER SELECTION

STANDARD CHAMBER PROFILES

Chamber selection is ultimately determined by the properties of the feed—especially the feed top size. A good place to begin is with the nominal values listed below, as these represent the optimal operating conditions for each crushing chamber.

For Standard chambers, ensure that 100% of the feed is equal to or below 80% of the open-side feed opening. To maximize chamber performance, the ideal feed size should be approximately 80% of the maximum feed size at the nominal setting.

MACHINE	STANDARD PROFILES	MINIMUM CSS [*]	CLOSED SIDE FEED OPENING AT MIN CSS	NOMINAL CSS	MAX FEED SIZE AT NOMINAL SETTING ³
C2c	Fine (STD F)	14 mm (0.55 in)	95 mm (3.74 in)	18 mm (0.71 in)	90.9 mm (3.58 in)
	Medium (STD M)	17 mm (0.67 in)	125 mm (4.92 in)	25 mm (0.98 in)	123.3 mm (4.85 in)
	Coarse (STD C)	19 mm (0.75 in)	185 mm (7.28 in)	25 mm (0.98 in)	172.8 mm (6.8 in)
C3	Fine (STD F)	13 mm (0.51 in)	107 mm (4.21 in)	18 mm (0.71 in)	113.0 mm (4.45 in)
	Medium (STD M)	17 mm (0.67 in)	150 mm (5.91 in)	25 mm (0.98 in)	163.0 mm (6.42 in)
	Coarse (STD C)	19 mm (0.75 in)	211 mm (8.31 in)	25 mm (0.98 in)	214.0 mm (8.43 in)
C4	Medium (STD M)	20 mm (0.79 in)	198 mm (7.8 in)	30 mm (1.18 in)	210.0 mm (8.27 in)
	Coarse (STD C)	25 mm (0.98 in)	252 mm (9.92 in)	35 mm (1.38 in)	259.0 mm (10.2 in)
	Extra Coarse (STD EC) ²	30 mm (1.18 in)	299 mm (11.77 in)	45 mm (1.77 in)	304.0 mm (11.97 in)

SHORT HEAD CHAMBER PROFILES

For Short Head chambers, 100% of the feed material should be equal to or smaller than the chamber's closed-side feed opening. This ensures smooth material flow through the chamber even at the higher operating speeds common in short head applications. In gravel pit applications with rounded material, these recommended feed limits should be reduced by 10–20%.

MACHINE	SHORT HEAD PROFILES	MINIMUM CSS ¹	CLOSED SIDE FEED OPENING AT MIN CSS	NOMINAL CSS	MAX FEED SIZE AT NOMINAL SETTING ³
C2c	Medium (SH M)	6 mm (0.24 in)	54 mm (2.13 in)	12 mm (0.47 in)	60.0 mm (2.36 in)
C3	Medium (SH M)	6 mm (0.24 in)	53 mm (2.09 in)	12 mm (0.47 in)	60.0 mm (2.36 in)
C4	Medium (SH M)	8 mm (0.31 in)	52 mm (2.05 in)	14 mm (0.55 in)	59.0 mm (2.32 in)

1. *Minimum CSS is theoretical and may not be achievable for certain materials or applications.

2. Requires a separate adapter ring to install the bowl liner.

3. To maximize chamber performance, ideal feed size should be 80% of the maximum feed size at the nominal setting.

STANDARD CHAMBER PROFILES

FINE (F)

RELATIVELY SMALL FEED OPENING / STEEP ANGLE

Fine chambers provide high reduction ratios and produce finer, more cubical aggregates. Fine profiles are often selected for tertiary crushing of prepared feed.

They work best when feed topsize is moderate. F chambers are a good choice when you need a smaller product and have controlled feed coming from a preceding screen or crusher.



MEDIUM (M)

BALANCED FEED OPENING AND ANGLE

Many secondary aggregate applications use a Medium liner as it provides versatility – good reduction and decent throughput. It can accept larger rock than Fine cavity and will still produce a relatively fine output.

This profile might be used, for example, when feed size is around 150 mm (5.91 in) or less and a mix of throughput and moderate fines is desired.

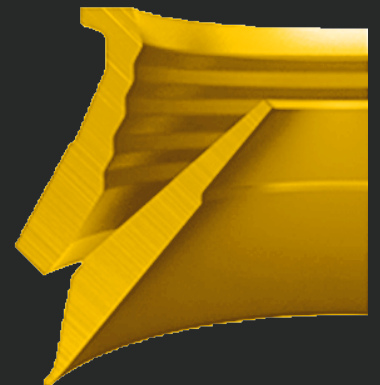


COARSE (C)

RELATIVELY LARGE FEED OPENING / GRADUAL ANGLE

These liners are typically used for secondary crushing, especially after a primary jaw crusher, where the goal is to take ~200–250 mm (7.80–9.8 in) feed down to perhaps 40–100 mm (1.5–3.9 in) range.

Coarse profiles prioritize capacity and can achieve higher reduction per stroke for bigger feed pieces. Use Coarse when you need to process larger feed from the pit and aren't aiming for the smallest product on that stage.

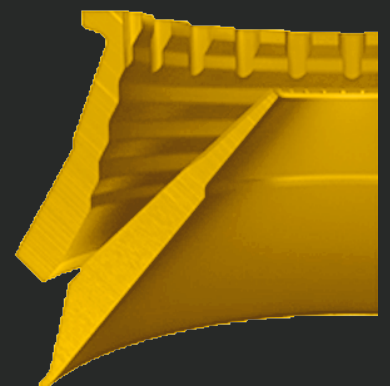


EXTRA COARSE (EC)

LARGEST FEED OPENING / SHALLOW CRUSHING ZONE

EC chambers are designed for handling very large feed sizes in secondary or even primary-crushing roles.

On a bigger McCloskey cone (e.g. C4), an EC liner can accept around 299 mm (11.8 in) feed. This profile is ideal when the cone crusher is being used in a secondary position with a very large feed coming directly from a primary crusher or blasting, and the emphasis is on handling capacity.



SHORT HEAD LINERS

OFFERED IN MEDIUM CHAMBER PROFILE



MCCLOSKEY STANDARD VS SHORT HEAD LINERS

Standard liners are typically used in secondary applications. Secondary applications don't necessarily need to be operated in closed circuit, but preferably choke fed.

Short head liners are used in tertiary or quaternary stage applications for fine crushing. Fine crushing requires choke feeding and closed circuit operation with oversize returning to the crusher.

LINER PART NUMBERS

MODEL	CRUSHING CHAMBER	MANTLE		BOWL LINER	
		18% MN	22% MN	18% MN	22% MN
C2c	STD F	552-033-010	552-033-010-22	552-033-011	552-033-011-22
	STD M	552-033-010	552-033-010-22	552-033-012	552-033-012-22
	STD C	552-033-010	552-033-010-22	552-033-013	552-033-013-22
	SH M	552-033-106-18	552-033-106-22	552-033-110-18	552-033-110-22
C3	STD F	528-013-040	528-013-040-22	528-013-041	528-013-041-22
	STD M	528-013-040	528-013-040-22	528-013-042	528-013-042-22
	STD C	528-013-040	528-013-040-22	528-013-043	528-013-043-22
	SH M	528-013-040	528-013-040-22	528-013-045	528-013-045-22
C4	STD M	509-023-060	509-023-060-22	509-023-061	509-023-061-22
	STD C	509-023-060	509-023-060-22	509-023-062	509-023-062-22
	STD EC*	509-023-060	509-023-060-22	509-023-063	509-023-063-22
	SH M	509-023-082	509-023-082-22	509-023-084	509-023-084-22

* Requires separate bowl adapter ring to install bowl liner for the EC chamber.

GUIDE TO REPLACING WEAR PARTS

Even under optimal operating conditions, cone crusher wear parts must be replaced periodically. Worn liners not only degrade performance but, if used beyond their wear limit, can damage the crusher.

PHYSICAL INDICATORS

Cracks, bulging, or wrinkling of the manganese surface—as well as any looseness in the liners—are clear signs that the wear parts have reached the end of their service life.

If a liner wears through or develops a hole, feed material can penetrate and contact the cone head or bowl directly. This exposes the metal components, allowing the mantle to grind against the head or the bowl liner against the adjustment ring, which damages the machined seating surfaces and threads.

Replacing liners at the proper time prevents this damage and costs significantly less than repairing scored seats or damaged threads.

PRODUCTION DROP

A significant drop in throughput or crusher output (for example, >10% reduction in tons per hour) is often a sign the liners are worn and the crusher cavity profile is no longer efficient. If you notice you have to open the crusher wider to maintain production or the product gradation is becoming coarser, the liners may be nearing end of life.

WEAR PROFILE/THICKNESS

Visually inspect liner profiles during maintenance shutdowns. When liners become too thin, the risk of exposing the underlying head or bowl to direct rock contact increases significantly. This can lead to cracks, backing material failure, or even the liner coming loose during operation. Running the crusher in this condition raises the chance of serious damage to major components and unplanned downtime. To avoid costly repairs, liners should always be replaced before they wear through.

ADJUSTMENT RING MOVEMENT (RING BOUNCE)

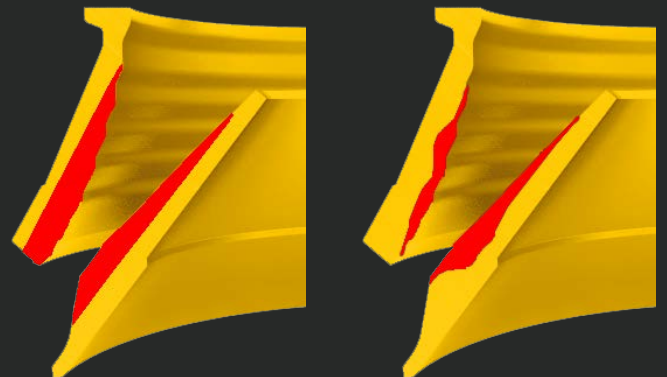
If the adjustment ring begins to move or “float” at a previously stable CSS, it’s a strong indicator that the liners have worn down and the crusher is overcompensating to maintain product size.

Frequent ring bounce and erratic power spikes near the end of liner life are also warning signs. As liners thin, the chamber geometry becomes less effective, forcing the crusher to work harder to achieve the same reduction—often leading to instability, reduced efficiency, and increased risk of damage.

EXCESSIVE WEAR IN ONE AREA

Uneven wear patterns – such as “bowled out” or pocketed areas on the mantle or bowl, can cause sections to wear through prematurely.

These distortions reduce overall liner life and capacity. To prevent failure, you may need to replace liners early or address the root cause, which is often uneven feed distribution.



WHEN TO CHANGE YOUR LINERS

ASSESS THE DEGREE OF LINER WEAR WITHOUT THE NEED TO STOP THE CRUSHER OPERATION

IN ORDER TO AVOID DAMAGE TO THE LINER SEATING SURFACES OF THE CRUSHER HEAD OR BOWL, WEAR PARTS MUST BE REPLACED BEFORE THEY ARE WORN THROUGH. IN NORMAL CONDITIONS, APPROXIMATELY 50% OF THE LINER WEIGHT IS CONSUMED WHEN LINERS ARE WORN OUT.

IT IS IMPORTANT TO KEEP A RECORD OF LINER WEAR IN ORDER TO ASSESS THE DEGREE OF LINER WEAR WITHOUT THE NEED TO STOP THE CRUSHER OPERATION

HOW TO ASSESS THE LINER WEAR:

1. On the initial set of new liners, place a mark on the adjustment cap driver ring where the pinion tooth makes contact with a driver ring tooth when the target crusher setting has been achieved.
2. Keep an accurate record of the number of teeth used to compensate for liner wear on this set of liners.
3. After the initial set of liners have worn out, but before moving the bowl, record the total number of teeth the driver ring has moved and also paint a horizontal liner on the side of the dust shell just below the bottom of the adjustment cap. This will be the baseline for determining how close the next liner sets are to being worn out.
4. When a new liner set has been installed, keep a record of the number of teeth the driver ring has moved and compare this number to the total number from the initial set of liners. This will give an estimation of the liner wear. The horizontal mark painted on the dust shell will also indicated when the liners are approaching the wear limit. The approximate minimum heights of the adjustment cap (A-dimension shown below) with worn liners are listed in the attached tables.

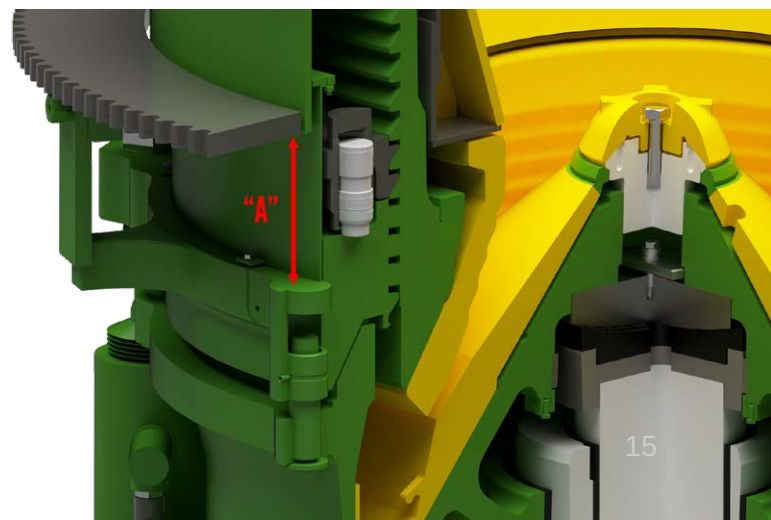
	NUMBER OF GEAR TEETH REQUIRED FOR ONE COMPLETE REVOLUTION	VERTICAL BOWL TRAVEL PER TOOTH	CSS VARIATION PER TOOTH	"A" APPROXIMATE DIMENSION WHEN THE LINERS ARE WORN OUT
C2c	138	0.28 mm (0.011 in)	0.18 mm (0.007 in)	$A = 37 + (1.58 \times \text{CSS})$
C3	156	0.33 mm (0.013 in)	0.23 mm (0.009 in)	$A = 37 + (1.59 \times \text{CSS})$
C4	176	0.29 mm (0.011 in)	0.20 mm (0.008 in)	$A = 26 + (1.69 \times \text{CSS})$

NOTES:

The "A" dimensions can be estimated using the formula in the table above using the CSS value in millimeters.

Please note that the values are based on the assumption of good wear, meaning similar mantle and concave wear, without distorted wear profiles.

For instance, a new EC liners on a C4 cone crusher is going to be operating at the minimum CSS of 30 mm.



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IN PERFORMANCE, UPTIME, AND TOTAL PEACE OF MIND.”



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