FIELD TECHNICAL SUPPLEMENT | MANTLE & CONCAVE INSPECTION

Cone Crusher Liner Wear

A practical guide to identifying wear distribution, recording repeatable observations and checking operating evidence before changing liners or settings.

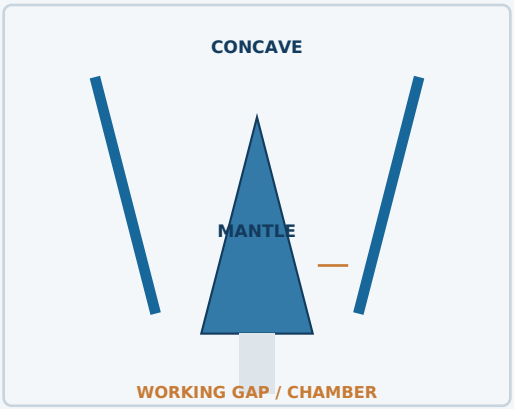


HOW TO USE THIS GUIDE

1. Identify the mantle, concave and chamber configuration installed on the crusher.
2. Map wear at repeatable axial and circumferential positions.
3. Compare the wear map with feed, CSS, throughput and product records.
4. Verify likely causes before adjusting settings or selecting replacement liners.

Important: A wear pattern is a clue, not proof of one cause. Several operating or installation factors can produce similar appearances.

1. Crushing chamber and liner components

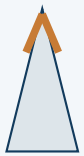


COMPONENT	FUNCTION / INSPECTION POINT
Mantle	Moving liner mounted on the crusher head. Inspect the working profile for changes in contour, local grooves, polishing, gouging, cracking or material breakout.
Concave / bowl liner	Stationary liner forming the outer chamber surface. Inspect corresponding zones and circumferential positions; compare the profile with the paired mantle.
Crushing chamber	Working space between mantle and concave. Wear changes the chamber profile and can affect the material flow path and product-size response.
CSS	Closed Side Setting. Record the value together with the measurement method and operating condition; compare readings only when the method is consistent.

Component geometry and CSS measurement procedures are crusher-model specific. The diagram is conceptual and not to scale.

2. Recognizing common mantle and concave wear patterns

Use the sketches as visual categories only. Actual wear may combine more than one pattern, and the same appearance can have different causes depending on feed, chamber profile and operating history.

 UNIFORM	**UNIFORM**	Wear distributed relatively evenly over the inspected working profile.
 BOTTOM-HEAVY	**BOTTOM-HEAVY**	Wear concentrated toward the lower axial portion of the inspected profile.
 TOP-HEAVY	**TOP-HEAVY**	Wear concentrated toward the upper axial portion of the inspected profile.
 ONE-SIDED	**ONE-SIDED**	Wear noticeably different around the circumference or on one side of the liner.

Interpretation rule: Confirm the pattern with repeatable photographs and measurements. If wear differs by axial zone and circumferential position, record both dimensions rather than forcing the condition into a single category.

Orange areas are schematic wear indicators only; they are not measured wear depths or universal liner profiles.

3. Wear pattern: first checks and supporting evidence

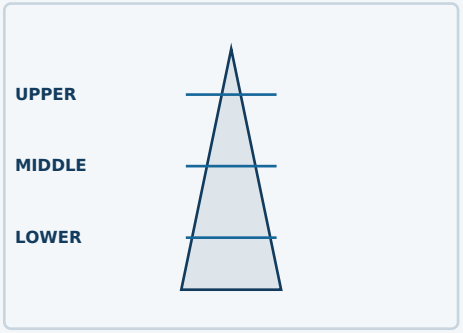
Treat each pattern as a starting point for investigation, not a stand-alone failure diagnosis. Confirm the suspected factor with operating records and repeatable inspection evidence.

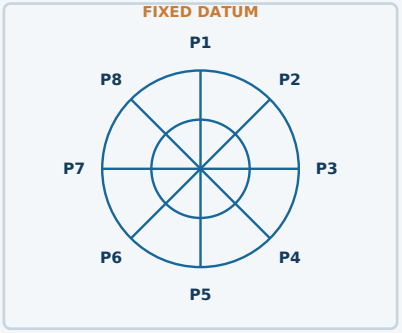
WEAR PATTERN	FIRST FACTORS TO VERIFY	EVIDENCE TO COMPARE	AVOID THIS ASSUMPTION
Uniform	Wear progression over operating hours; liner profile and cavity suitability; consistency of feed and operating load.	Previous wear maps, service hours, throughput trend, product gradation and power/current trend.	Do not assume uniform wear means the liner is still serviceable; compare the remaining profile with OEM criteria.
Bottom-heavy	Feed gradation and fines content; CSS history; chamber profile; operating load and feed presentation.	Feed samples, CSS readings with method stated, throughput/power history and prior liner profile records.	Do not prescribe a setting change from the wear pattern alone; verify feed and chamber conditions first.
Top-heavy	Oversize fraction; bridging or segregation near the feed opening; feed presentation; cavity and liner pairing.	Feed-size distribution, chute observations, blockage/interruption log, liner part numbers and installation record.	Do not attribute it automatically to coarse feed; confirm whether feed is centered and consistently distributed.
One-sided	Feed centering and circumferential distribution; chute alignment; liner orientation, seating and installation condition.	Photos indexed to a fixed datum, feed chute inspection, installation records and observations around the full circumference.	Do not assume a casting or material defect without checking feed distribution and liner fit.

Interpretation note: Several operating or installation factors can produce similar appearances. Confirm the cause with site data, the crusher configuration and the OEM's liner profile guidance.

4. Mapping wear consistently

A useful wear record identifies both where the observation was made and how it was measured. Repeat the same reference positions at each inspection so changes can be compared over time.





LOCATION CODE EXAMPLES

Mantle / M / P3 — mantle, middle axial zone, circumferential position P3.

Concave / L / P6 — concave, lower axial zone, circumferential position P6.

Use a fixed datum and keep the orientation convention unchanged between inspections.

Inspection record: what to capture and how to compare it

INSPECTION ITEM	RECORD CONTENT	COMPARISON / QUALITY RULE
Liner identity and history	Mantle and concave part numbers, cavity designation, liner material if specified, installation date and operating hours since installation.	Confirm the installed parts match the crusher configuration and compare records from the same liner set.
Wear profile / remaining section	Measurement location code, method or template ID, instrument ID where applicable, reading and unit, plus a photo reference.	Use the OEM-approved measurement or profile method. Compare the same datum, location and method; do not apply a generic wear limit.
Surface condition	Note polishing, abrasive grooves, local steps, gouging, cracking, spalling, deformation, buildup or packed material.	Photograph before and after cleaning where practical. Distinguish actual metal loss from deposits or packed fines.
Seating and contact	Record visible seating/contact marks, fit observations, liner orientation and any installation irregularity.	Check against the applicable OEM installation procedure and the documented liner arrangement.
CSS / setting	Record CSS value, measurement method, date/time and the operating condition under which it was measured.	Compare only readings obtained by a consistent method and under comparable stated conditions.

Measurement discipline: Record units, instrument identity and method. Do not compare readings taken at different locations or by different methods as though they were equivalent. Where direct thickness measurement is unsuitable, use the OEM-approved profile or inspection method.

5. Photo documentation and inspection quality

Photographs are most useful when they can be linked to a known liner, a fixed orientation and a repeatable inspection location. The generated scene below is illustrative, not a record of an actual site inspection.



REPEATABLE PHOTO PRACTICE

Overall view: show the complete liner, its orientation and the fixed reference datum.

Axial-zone views: photograph upper, middle and lower areas so the wear distribution can be compared.

Circumferential views: include the indexed positions around the liner, especially where wear appears uneven.

Surface close-ups: record grooves, local steps, gouging, cracking, spalling or deposits with a location reference.

Traceability: link every image ID to the corresponding component / zone / position record.

Safety: inspect only after site isolation, lockout, stored-energy control and access authorization have been verified.

Example photo index format — illustrative IDs only

PHOTO ID EXAMPLE	COMPONENT / LOCATION	VIEW TYPE	WHAT THE IMAGE SHOULD SHOW
OV-01	Overall liner view	Full view	Complete component, orientation and fixed datum for later comparison.
M-U-P1-01	Mantle / upper / P1	Close-up	Surface condition at a repeatable upper-zone circumferential position.
M-M-P3-01	Mantle / middle / P3	Close-up	Local profile, grooves or polished areas at the mapped position.
C-L-P6-01	Concave / lower / P6	Close-up	Concave surface condition and any localized wear feature at the mapped position.

Example IDs show only a naming convention. They are not evidence of actual measurements, defects or an inspection performed at a customer site.

6. Operating evidence: information to collect

Review the operating window that corresponds to the liner wear being assessed. A wear pattern becomes more useful when compared with feed conditions, crusher settings and process response over the same period.

OPERATING ITEM	WHAT TO RECORD	WHY IT MATTERS / SOURCE
Operating hours	Hours since the current mantle and concave set was installed; note any liner change or major shutdown.	Provides the time basis for comparing wear progression. Use the plant operating-hour or maintenance record.
Feed material and gradation	Material type/source, representative feed-size distribution, oversize fraction and changes in feed blend.	Changes in feed size and material characteristics can alter how the chamber is loaded. Use sampling and feed records.
Feed distribution	Whether feed is centered and distributed consistently; note chute changes, segregation, bridging or interruptions.	Helps investigate circumferentially uneven wear and inconsistent chamber loading. Use site observations and chute inspection.
Moisture / clay condition	Record observed moisture condition and whether sticky fines or buildup are present.	Helps distinguish metal wear from packed material and identify feed-handling conditions that may affect flow.
CSS / setting	Measured CSS, measurement method, date/time and whether the crusher was in the specified measurement condition.	Allows settings to be compared consistently with wear profile and product-size changes.
Throughput and power	Production rate and motor power/current over the same operating period; include units and time basis.	Shows whether wear observations coincide with a change in load or process performance.
Product gradation	Product size distribution or relevant screen fractions, with sample date and sampling point.	Helps evaluate whether liner profile and setting changes correspond with product-size response.
Recirculating load / events	Oversize return or recirculating-load trend, stoppages, tramp-material events and major setting changes.	Provides context for abnormal operating events that may affect liner condition or process stability.

Record actual values, units, sampling dates and source records. If a value is unavailable, leave it unreported rather than estimating it.

7. Diagnostic sequence: verify before changing parts

Use the sequence below to narrow the investigation. Do not assign a cause from the wear appearance alone; confirm it against operating records and repeatable inspection evidence.

STEP	CHECK	WHAT CONFIRMS OR WEAKENS THE HYPOTHESIS
1	Confirm the wear observation.	Same component, datum, axial zone and circumferential position compared; surface cleaned sufficiently; photos and measurements are repeatable.
2	Review feed conditions.	Feed samples, size distribution, feed centering, chute condition, moisture/clay and bridging or interruption records.
3	Verify chamber and settings.	Correct mantle/concave part numbers and pairing, cavity profile, seating/installation record and CSS measurement method.
4	Compare process response.	Throughput, power/current, product gradation, recirculating load and operating events from the same time window.
5	Validate the action.	Conclusion supported by mapped wear and operating evidence; proposed change checked against OEM guidance and site acceptance criteria.

Do not use appearance alone to approve a liner change or setting adjustment. There is no single wear-thickness or service-life limit that applies to every cone crusher liner. Use the correct OEM liner profile, minimum remaining-section requirement, installation instructions and site acceptance criteria for the specific crusher and liner set.