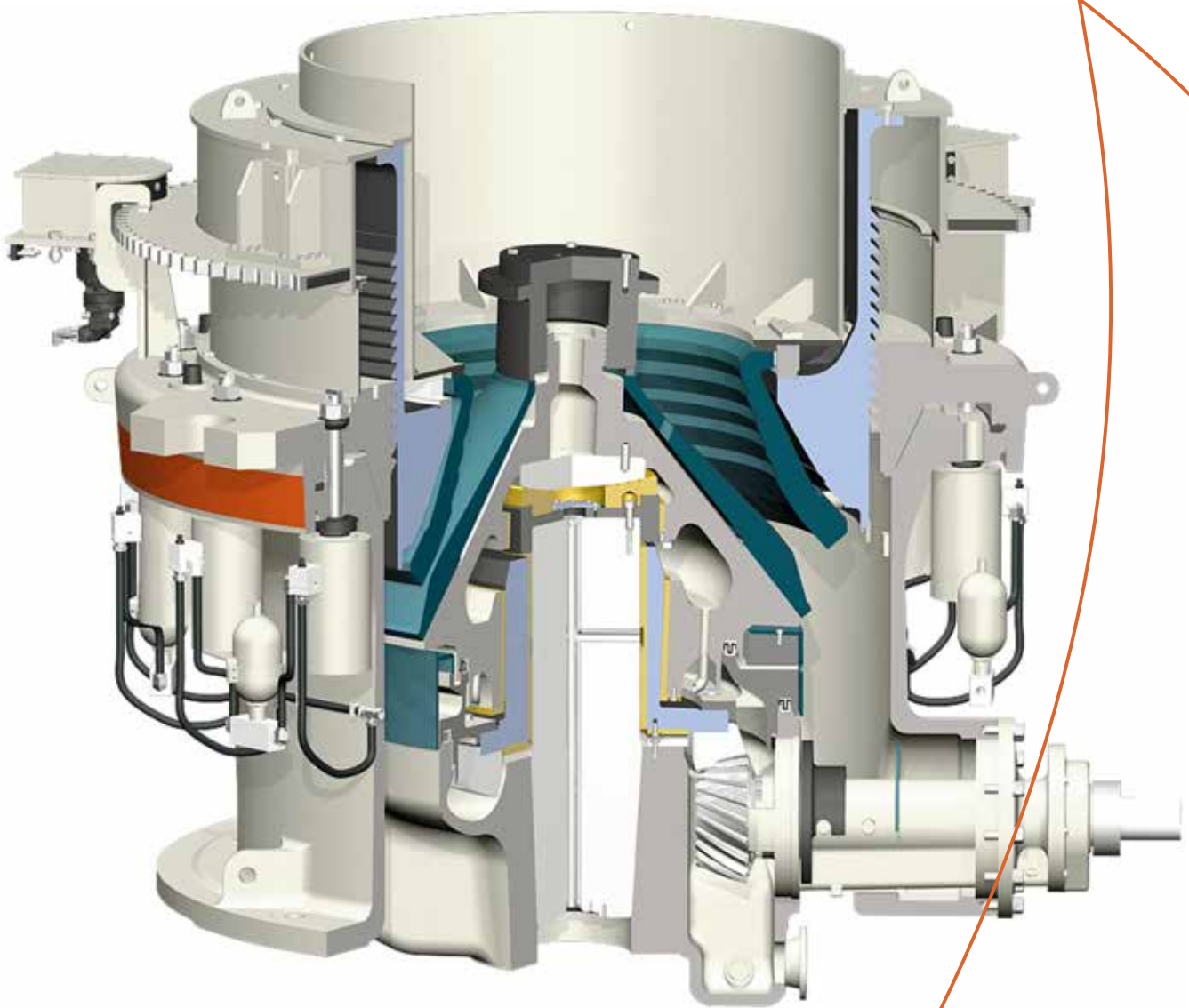
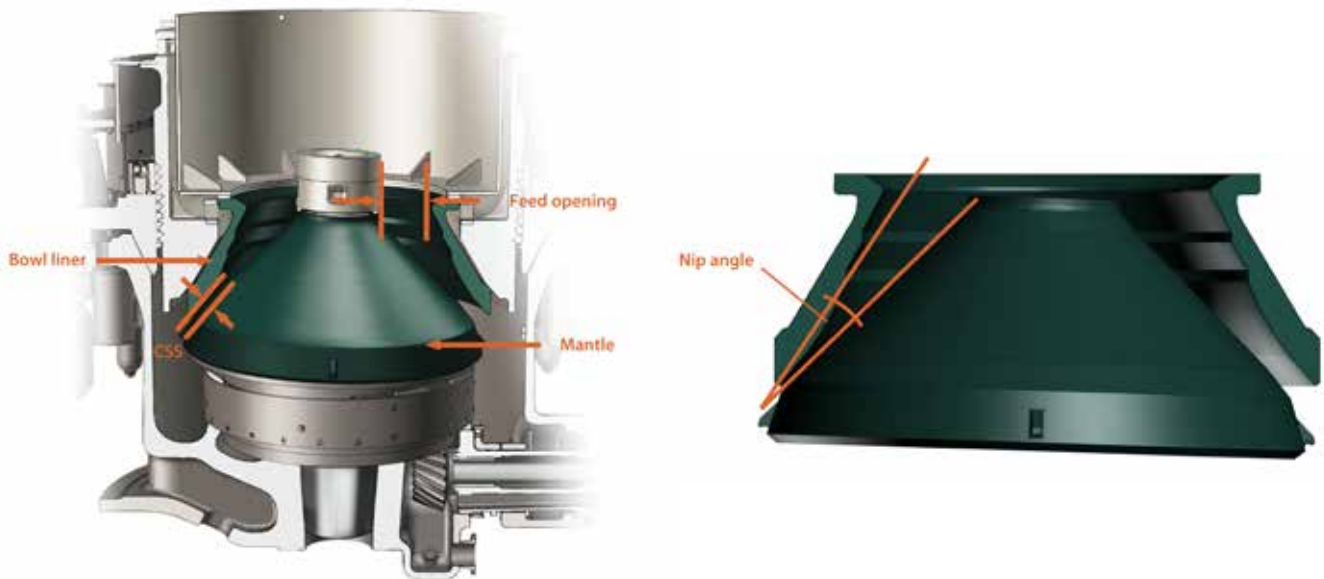


Nordberg MP series cone crushers

Wear parts application guide





Wear parts application guide - Nordberg MP series cone crusher

MP cone crusher and basic concepts

The MP Cone crusher is a compressive crusher in which feed material is crushed between a fixed bowl liner and a moveable mantle. Bigger rock particles are crushed directly between the surfaces of the mantle and bowl liner. This is called single layer crushing. Smaller rock particles are crushed between other rock particles, which is termed multi-layer crushing or inter-particle Comminution. Multi-layer crushing plays a significant role in the MP cavity. This improves the reduction through the crusher and end product shape.

Closed side setting (CSS)

The closed side setting has a significant effect on the product gradation, capacity, and power draw of an MP cone crusher.

The closed side setting is measured from the bottom of the mantle to the bottom of the bowl liner at their closest point during the gyrating cycle.

Feed opening

The feed opening defines the maximum feed size for a crushing cavity. The closed side feed opening is the smallest distance between the top of the mantle and bowl liner as measured when they are at their closest to one another during their gyrating cycle.

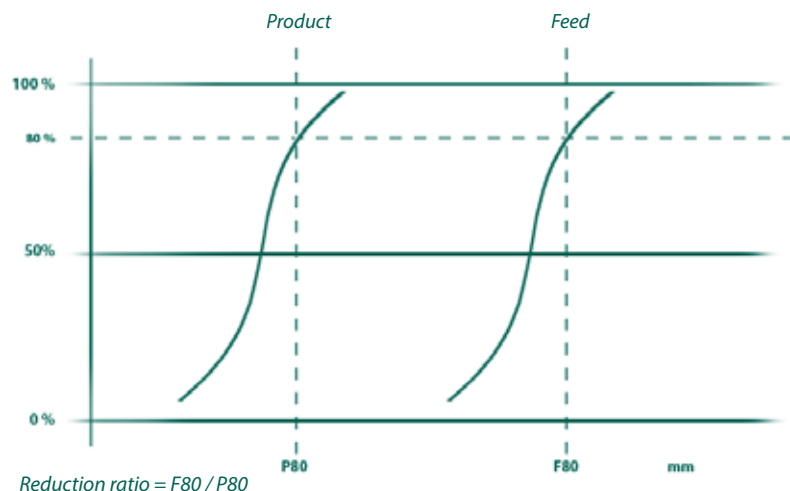
The open side feed opening is the distance between the top of the mantle and bowl liner as measured when they are at their farthest from one another during their gyrating cycle. In MP cavities, the maximum feed size is equal to the closed side feed opening.

Nip angle

The nip angle is the angle between the mantle and bowl liner. Too large a nip angle reduces the capacity and increases the wear as feed material will tend to slip back upward in the cavity rather than crush. This can be observed as bouncing or boiling of the feed material.

Reduction ratio

The reduction ratio is the ratio between the size of feed and the size of the outgoing product. It is normally measured at the 80% passing point. A typical reduction ratio in the MP standard cavity is 4-6 and in the MP short head cavity it is 3-5.





How to operate a MP cone crusher

In order to get optimum capacity and maximum wear life of wear parts, consider the following points:

1. Check the feed arrangement:

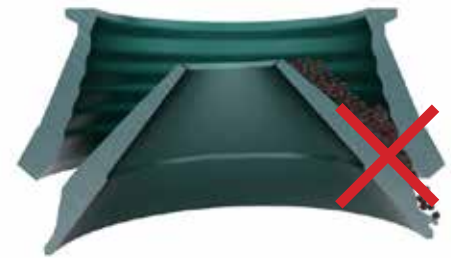
- The crusher should be choke fed so that the crushing chamber is full all the time. This is important, especially in fine crushing. Choke feeding maximizes the amount of multi-layer crushing, improves the shape of the crushing cavity as it wears and improves the crushing efficiency. => Choke feed level varies.
- The feed must be distributed evenly 360° around the crushing chamber. Uneven feed distribution may cause power and force cycles through each gyration cycle. Evenly distributed feed will result in a more steady power and crushing force.
- Feed should not be segregated (for example finer material on one side of the cavity and coarser material on the other side of the cavity).
- Flow of the feed should be stable and continuous.

2. Check the feed size and gradation:

- Oversize feed material decreases capacity and can cause abnormal wear of the liners
- Too small a feed size for the cavity increases



Too big feed material



Too small feed material

es the wear at the bottom part of the liners and may cause poor utilization of the wear parts

- Fines should be screened out before the material is fed to the crusher as the fines may cause packing, as well as creating high forces in the cavity that may lead to going over the power and/or force limit.
- Feed should be well graded with no gaps in the size distribution.

3. Check the power draw. Crusher should operate with a steady power draw and as close to full rated power as practical, depending the circuit design and the ability to control system.

Note: Feed material characteristics such as gradation, bulk density, moisture, clay content and crushability have significant impact on crusher capacity.



Example of good feed material level.



4. Check the closed side setting. The setting should be close to the required product. The setting is too small if the adjustment ring is moving on the main frame (ring bounce).

- Larger setting -> Product size increases
- Larger setting -> Capacity increases
- Larger setting -> Power draw decreases

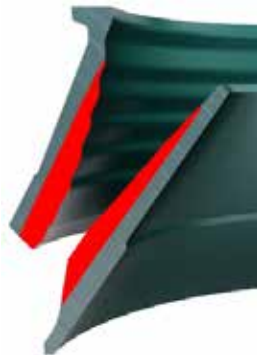
5. Check the crusher operating speed

Check that the operating speed of the crusher matches the application and liner profile used.

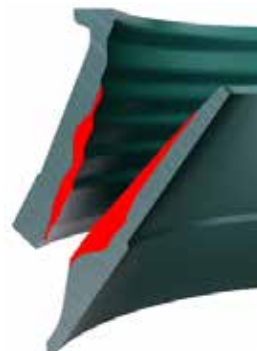
6. Check the cavity in use.

- Based on feed size
- Based on required end product size which determines the required setting range
- Check the crushing reduction ratio

7. Check the wear profile of the liners: a distorted wear profile may decrease capacity, increase the liner wear rate and increase the crushing force.



Example of normal wear. Obtained with correct feed arrangements, feed gradation and parameters for the cavity.



Example of abnormal wear. Capping has occurred.

	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
MP800						
XT525/XT520/XT515		C(●●●)		C(●●●)		C(●●●)
XT510	●●●	●●	●●●	●●	●●●	●
XT710	C(●●●)		C(●●●)		C(●●●)	
XT750/XT770	C		C		C	
MP1000						
XT525/XT520/XT515		C(●●●)		C(●●●)		C(●●●)
XT510	●●●	●●	●●●	●●	●●●	●
XT710	C(●●●)		C(●●●)		C(●●●)	
XT750/XT770	C		C		C	
MP1250						
XT515	●●●	●●	●●●	●●	●●●	●●●
XT525		●●●	●	●●●	●	
XT710	C	C	C	C	C	C
XT750/770	C	C	C	C	C	C

Definitions for different rock types are presented in Wear and materials application guide, page 4.

● Can be used ●● Good choice ●●● Recommended C - Contact Metso representative for more information

MP cone crusher cavity selection

Each MP Cone Crusher has several cavity options with different feed openings and setting ranges. The correct cavity can be selected based on the feed size, setting and application.

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 and may be in closed circuit returning to the crusher.

Liners are manufactured from XT510, XT515, XT520, XT525, XT710, XT750 or XT770 material depending on the application and material characteristics.

Crusher size	Cavity	Standard		Short head	
		Minimum setting "A"	Feed opening "B"	Minimum setting "A"	Feed opening "B"
MP800	Extra fine	19 mm (0.75 in)	144 mm (5.67 in)	8 mm (0.31 in)	43 mm (1.69 in)
	Fine	19 mm (0.75 in)	241 mm (9.49 in)	10 mm (0.39 in)	71 mm (2.80 in)
	Medium	25 mm (0.98 in)	308 mm (12.13 in)	12 mm (0.47 in)	113 mm (4.45 in)
	Coarse	32 mm (1.26 in)	343 mm (13.50 in)		
	Extra coarse				
MP1000	Extra fine	22 mm (0.87 in)	241 mm (9.49 in)	8 mm (0.31 in)	63 mm (2.48 in)
	Fine	25 mm (0.98 in)	242 mm (9.53 in)	10 mm (0.39 in)	90 mm (3.54 in)
	Medium	32 mm (1.26 in)	343 mm (9.57 in)	12 mm (0.47 in)	140 mm (5.51 in)
	Coarse	38 mm (1.50 in)	360 mm (14.17 in)	19 mm (0.75 in)	235 mm (9.25 in)
	Extra coarse				
MP1250	Extra fine	22 mm (0.87 in)	249 mm (9.80 in)	8 mm (0.31 in)	71 mm (2.80 in)
	Fine	25 mm (0.98 in)	250 mm (9.84 in)	10 mm (0.39 in)	98 mm (3.86 in)
	Medium	32 mm (1.26 in)	351 mm (13.82 in)	12 mm (0.47 in)	148 mm (5.83 in)
	Coarse	38 mm (1.50 in)	368 mm (14.49 in)		
	Extra coarse				

1. The minimum setting is that at which the crusher will operate without causing ring bounce. Depending on the crushing characteristics of the rock, this setting can change.
2. Feed opening "B" is at a minimum setting "A".
3. Maximum feed size vary from 80 to 100% of "B" depending on the machine size and material.





Crusher size	Number of gear teeth required for one complete revolution	Vertical bowl travel per tooth	Setting variation per tooth	Setting for 1/4 revolution of the driver ring	"A" Approximate dimension when the liners are worn out
MP800	306	0.332 mm (0.013 in)	0.22 mm (0.009 in)	16.83 mm (0.663 in)	STD A = 91 + (1.50 x CSS) SH HD A = 77 + (1.50 x CSS)
MP1000	120	0.626 mm (0.025 in)	0.41 mm (0.016 in)	12.42 mm (0.489 in)	STD A = 76 + (1.50 x CSS) SH HD A = 105 + (1.50 x CSS)
MP1250	120	0.626 mm (0.025 in)	0.41 mm (0.016 in)	12.42 mm (0.489 in)	STD A = 123 + (1.50 x CSS) SH HD A = 141 + (1.50 x CSS)

When to change liners

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.

See the following instructions

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.

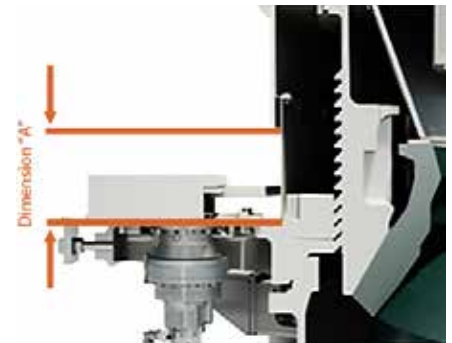
4. When a new liner set has been installed, keep a record of the number of teeth the driver ring has moved and compare this number to the total number from the initial set of liners. This will give an estimation of the liner wear. The horizontal mark painted on the dust shell will also indicate when the liners are approaching the wear limit. The approximate minimum heights of the adjustment cap (A-dimension) with worn liners are listed in the attached tables.

When changing liners and determining liner wear, follow the instructions in the related Nordberg MP cone crusher instruction manual.

Production considerations may sometimes favor changing of wear parts before they are fully utilized. Hourly capacity or product quality may decrease toward the end of the liner wear life and it may be more economical to change before the end of the liner wear life.

Typically, distorted or heavily worn wear profiles can cause a reduction in capacity. Other symptoms of poorly worn liners are high power draw and ring bounce. Also, the wear life can be reduced because the wear is sometimes concentrated in a small zone

rather than spread along the full cavity and the cavity may have to be replaced before they are fully worn. This results in poor utilization and a higher operating wear costs.



Caution: A is given for a good wear. Meaning similar mantle and concave wear, without distorted wear profile = correct application according to cavity selected.



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