NESANS

TECHNICAL GUIDES

VSI Rotor Tip Selection: Tungsten Carbide vs Chrome Iron for Different Feed Materials

Compare tungsten carbide vs chrome iron VSI rotor tips. Wear rate analysis and cost-per-ton calculations for granite, basalt, and river sand processing.

Author: Sivabalan Selvarajan

Published: January 13, 2026

Reading Time: 3 minutes

VSI rotor tips are the primary wear components in sand-making operations, directly impacting product quality, operating costs, and equipment reliability. The choice between tungsten carbide and chrome alloy tips involves trade-offs between wear life, impact resistance, and cost per tonne processed. Understanding these trade-offs enables operators to select the optimal tip material for their specific application, potentially reducing wear costs by 30-50% while maintaining consistent product quality.

Understanding VSI Rotor Tip Function

Rotor tips accelerate feed material to 60-80 m/s before impact against the anvil ring or rock shelf. This extreme velocity subjects tips to:

- **Abrasive wear:** Material sliding across tip surface
- **Impact wear:** Direct collision with feed particles

- **Thermal stress:** Heat from friction and impact energy
- **Fatigue:** Repeated stress cycles causing material breakdown

Material Comparison

Tungsten Carbide Tips

PROPERTY	SPECIFICATION	IMPACT ON PERFORMANCE
Hardness	1300-1600 HV	Excellent abrasion resistance
Toughness	Moderate (brittle)	Susceptible to impact damage
Wear Rate	0.5-1.5g per tonne	2-4x longer life than chrome
Cost	₹8,000-15,000 per tip	3-5x higher than chrome
Best Application	Abrasive material, consistent feed	Granite, quartzite, silica sand

Chrome Alloy Tips

PROPERTY	SPECIFICATION	IMPACT ON PERFORMANCE
Hardness	58-65 HRC	Good abrasion resistance
Toughness	High	Resists impact fracture
Wear Rate	2-4g per tonne	Shorter life, predictable wear
Cost	₹2,000-4,000 per tip	Lower initial investment
Best Application	Variable feed, tramp metal risk	River gravel, recycled concrete

Cost-Per-Tonne Analysis

SCENARIO	TUNGSTEN CARBIDE	CHROME ALLOY	WINNER
Hard granite, clean feed	₹0.12/t	₹0.18/t	Tungsten

SCENARIO	TUNGSTEN CARBIDE	CHROME ALLOY	WINNER
Medium basalt	₹0.10/t	₹0.11/t	Similar
River gravel with debris	₹0.25/t (breakage)	₹0.14/t	Chrome
Recycled concrete	₹0.30/t (rebar damage)	₹0.16/t	Chrome

Selection Guidelines

Choose Tungsten Carbide When:

- Processing highly abrasive material (AI > 0.4)
- Feed is clean and consistent (no tramp metal)
- Downtime cost exceeds tip cost (continuous operation)
- Product quality requires consistent tip geometry

Choose Chrome Alloy When:

- Tramp metal contamination is possible
- Feed contains variable hardness material
- Budget constraints limit initial investment
- Operating in remote areas (easier sourcing)

Hybrid Strategies

STRATEGY	IMPLEMENTATION	BENEFIT
Tungsten on leading edge	Tungsten tips face feed direction	Wear life with impact protection
Material-based switching	Change tips with material type	Optimize for each application
Seasonal adjustment	Chrome in wet season (debris)	Reduce breakage losses

Maintenance Impact

Tip Rotation Schedule

MATERIAL	TUNGSTEN ROTATION	CHROME ROTATION
Hard granite	Every 80-120 hours	Every 40-60 hours
Medium rock	Every 120-180 hours	Every 60-100 hours
Soft limestone	Every 200-300 hours	Every 100-150 hours

Conclusion

The optimal rotor tip material depends on feed characteristics, operational priorities, and cost structure. Neither tungsten carbide nor chrome alloy is universally superior—each excels in specific applications. Detailed cost-per-tonne tracking over multiple tip changes provides the data needed for informed selection. The right choice reduces wear costs by 20-40% compared to inappropriate material selection.

Topics: #Rotor Tips #Sand Making #VSI Crusher #Wear Parts

NESANS
www.nesansindia.in
SF No 20/1, Eachanary Madukkarai Road, Coimbatore, TN 641024
+91 9578 799 755