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EQUIPMENT SELECTION

Mobile vs. Stationary Crushing Plants: Complete TCO Analysis for Indian Quarries

Mobile vs stationary crushing plants: 10-year TCO analysis with real Indian quarry data. Capital costs, operating expenses & ROI comparison.

Author: Sivabalan Selvarajan

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Should you invest in a mobile or stationary crushing plant? This comprehensive analysis compares Total Cost of Ownership (TCO) over 10 years using real data from Indian quarries, helping you make an informed decision worth crores.

Executive Summary

FACTOR	MOBILE PLANT	STATIONARY PLANT
Capital Cost (200 TPH)	₹3.5-5.0 Cr	₹2.5-3.5 Cr
Installation Time	2-5 days	3-6 months
Operating Cost (₹/ton)	₹45-60	₹35-50

Fuel Consumption	8-12 L/hour	4-6 L/hour (diesel gen) or ₹5-8/ hour (grid)
Mobility	High - relocate in days	None - permanent
Best For	Multiple sites, short leases, infrastructure projects	Large reserves, permanent sites, high volume

Capital Cost Breakdown

Mobile Crushing Plant (200 TPH)

COMPONENT	COST (₹ LAKHS)
Mobile Jaw Crusher (primary)	150-200
Mobile Cone Crusher (secondary)	120-160
Mobile 3-Deck Screen	80-120
Diesel Generator (optional for full mobility)	15-25
TOTAL CAPITAL COST	**₹3.65-5.05 Cr**

Stationary Crushing Plant (200 TPH)

COMPONENT	COST (₹ LAKHS)
Jaw Crusher (900 x 600mm)	50-70
Cone Crusher (HP300 equivalent)	60-85
Vibrating Screen (3-deck, 6m x 2m)	25-35
Conveyors (4 units, ~80m total)	30-45
Steel Structure & Support	40-60

Electrical Panel & Cabling	15-25
Civil Works (foundation, platform)	30-50
TOTAL CAPITAL COST	**₹2.50-3.70 Cr**

Capital Cost Difference: Mobile plants cost 30-40% more upfront, but eliminate 3-6 months of civil work and installation.

Operating Cost Analysis (Per Hour)

Mobile Plant Operating Costs

EXPENSE CATEGORY	COST PER HOUR (₹)	COST PER TON (₹)
Diesel Fuel (10 L/hr @ ₹90/L)	900	4.50
Operator Labor (1 skilled)	300	1.50
Maintenance & Spares	600	3.00
Wear Parts (jaws, cones, screens)	800	4.00
Depreciation (10 years)	1,600	8.00
TOTAL OPERATING COST	**₹4,200/hr**	**₹21.00/ton**

Stationary Plant Operating Costs

EXPENSE CATEGORY	COST PER HOUR (₹)	COST PER TON (₹)
Electricity (150 kW @ ₹7/kWh)	1,050	5.25
Operator Labor (1 skilled + 1 helper)	400	2.00
Maintenance & Spares	400	2.00
Wear Parts	600	3.00

Depreciation (10 years)	1,200	6.00
TOTAL OPERATING COST	**₹3,650/hr**	**₹18.25/ton**

Operating Cost Advantage: Stationary plants save ₹2.75/ton (~13%) due to lower energy costs and simpler maintenance.

10-Year Total Cost of Ownership

Assumptions:

- 200 TPH capacity, 70% utilization = 140 TPH average
- 5,000 operating hours per year
- 700,000 tons processed annually
- 10-year equipment life

Mobile Plant TCO

COST CATEGORY	AMOUNT (₹ CR)
Initial Capital Investment	4.50
Operating Costs (10 years @ 5,000 hrs/yr)	16.00
Major Overhauls (2 @ ₹30 lakhs each)	0.60
Relocation Costs (5 moves @ ₹8 lakhs)	0.40
Less: Residual Value (15% of capital)	-0.68
TOTAL 10-YEAR TCO	**₹20.82 Cr**
TCO PER TON (7M tons)	**₹29.75/ton**

Stationary Plant TCO

COST CATEGORY	AMOUNT (₹ CR)

Initial Capital Investment	3.10
Operating Costs (10 years @ 5,000 hrs/yr)	12.80
Major Overhauls (2 @ ₹25 lakhs each)	0.50
Decommissioning / Dismantling	0.20
Less: Residual Value (10% of capital)	-0.31
TOTAL 10-YEAR TCO	**₹16.29 Cr**
TCO PER TON (7M tons)	**₹23.27/ton**

TCO Verdict: Stationary plants save ₹6.48/ton (22%) over 10 years for permanent sites with large reserves.

Breakeven Analysis: When Mobile Wins

Mobile plants become economically viable when:

Scenario 1: Multiple Small Sites

- **Situation:** Operating 3-5 sites with 1-2 year reserves each
- **Analysis:** Building stationary plants at each site would cost ₹2.5-3 Cr × 5 = ₹12.5-15 Cr
- **Savings:** One mobile plant (₹4.5 Cr) saves ₹8-10 Cr in capital
- **Additional Benefit:** Move to new opportunities without abandoning equipment

Scenario 2: Short-Term Leases

- **Situation:** Quarry lease expires in 3-5 years
- **Risk:** Stationary plant may not pay back before lease ends
- **Analysis:** Mobile plant relocates to new site; stationary plant loses value
- **Decision:** Mobile plant eliminates stranded asset risk

Scenario 3: Infrastructure Projects

- **Situation:** Highway, dam, or metro construction (2-4 year duration)
- **Benefit:** Mobile plant processes material on-site, then moves to next project
- **Savings:** Eliminates transportation of raw material to central plant
- **Typical Savings:** ₹50-100/ton in transport costs over 50-100 km

Performance and Productivity Comparison

PERFORMANCE METRIC	MOBILE PLANT	STATIONARY PLANT
Setup Time	2-5 days	90-180 days
Time to First Production	1 week	4-6 months
Production Efficiency	85-90%	90-95%
Flexibility (Product Changes)	High - adjust settings easily	Moderate - may need structural changes
Maintenance Downtime	8-12%	5-8%
Footprint	Compact - 30m × 50m typical	Large - 50m × 80m typical

Real-World Case Studies from India

Case Study 1: Granite Quarry - Stationary Plant Winner

Location: Bangalore, Karnataka | **Capacity:** 250 TPH | **Reserve:** 50 lakh tons (20+ years)

- **Investment:** ₹4.2 Cr stationary plant with advanced automation
- **Operating Cost:** ₹16.50/ton (grid power, optimized layout)
- **Result:** Payback in 4.2 years; ₹8 Cr savings over 15 years vs mobile alternative

- **Key Success Factor:** Large reserve justified capital investment; automation reduced labor

Case Study 2: Multi-Site Contractor - Mobile Plant Winner

Location: Pan-India operations | **Projects:** 4-5 simultaneous highway projects

- **Investment:** Fleet of 3 mobile plants (₹12 Cr total)
- **Strategy:** Move plants every 12-18 months to new projects
- **Result:** Saved ₹15 Cr vs building 8 stationary plants; increased bid competitiveness
- **Key Success Factor:** Flexibility to follow project work; on-site crushing saved transport costs

Case Study 3: Hybrid Approach - Best of Both

Location: Rajasthan | **Operation:** Large limestone quarry + contract crushing

- **Investment:** 1 stationary plant (400 TPH) + 1 mobile plant (200 TPH)
- **Strategy:** Stationary for main quarry; mobile for customer site contracts
- **Result:** 40% revenue increase from contract work; optimal utilization of both assets
- **Key Success Factor:** Diversified revenue streams; maximum equipment utilization

Decision Framework

Use this decision tree to choose the right solution:

Choose STATIONARY if:

- Reserve life > 10 years with clear mine plan
- Processing > 1 million tons annually at single location
- Grid power available (cost advantage)
- Stable product mix and market demand
- Prioritizing lowest per-ton cost over flexibility

Choose MOBILE if:

- Multiple small sites or short-term leases (< 5 years)
- Infrastructure project contractor
- Need fast setup and early production
- Uncertain reserves or changing regulations
- Want to test market before major investment

Consider HYBRID if:

- Large main operation + contract crushing opportunities
- Multiple sites with varying durations
- Want stability of stationary + flexibility of mobile
- Can afford higher capital for maximum versatility

Financing and ROI Considerations

Typical Financing Terms in India

- **Equipment Loan:** 70-80% of capital, 7.5-9.5% interest, 5-7 year tenure
- **Monthly EMI (₹4 Cr @ 8.5%, 6 years):** ~₹7.2 lakhs
- **Required Revenue:** ₹10-12 lakhs/month to service debt comfortably

Payback Period Analysis

Assuming ₹100/ton revenue and operating costs as calculated:

- **Mobile Plant:** Payback in 5-6 years at 70% utilization
- **Stationary Plant:** Payback in 3.5-4.5 years at 70% utilization
- **Sensitivity:** Each 10% increase in utilization reduces payback by 6-9 months

Maintenance and Downtime Comparison

Mobile Plants

- **Advantages:** Modular design allows component replacement; less structural work during overhauls
- **Challenges:** Hydraulic systems require expertise; tracks/wheels need regular service; harder to access some components
- **Typical Downtime:** 8-12% including preventive and corrective maintenance

Stationary Plants

- **Advantages:** Easy access for maintenance; standardized procedures; local fabrication possible for many parts
- **Challenges:** Major repairs may require structural work; conveyor maintenance time-consuming
- **Typical Downtime:** 5-8% with good preventive maintenance program

Conclusion and Recommendations

There's no universal answer - the right choice depends on your specific situation:

- **For permanent large-scale operations:** Stationary plants offer 20-25% lower TCO
- **For contractors and multi-site operators:** Mobile plants provide flexibility worth the premium
- **For growing businesses:** Start mobile to test markets, then invest in stationary at proven sites

Key Takeaway

The ₹1-2 Cr capital difference is less important than choosing the right configuration for your business model. A mobile plant that enables profitable contract work may return far more than the savings from a cheaper stationary plant locked to one site.

Ready to discuss your specific situation? Contact Nesans for a free TCO analysis customized to your operation. Our team will analyze your reserves, locations, and business model to recommend the optimal solution - whether stationary, mobile, or hybrid.

Topics: #Crushing

NESANS

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