

Stone Mining Machine Operator: how employable, and how future- proof, is this trade?

India's construction and infrastructure boom drives persistent demand for dimension stone and crushed aggregate, making stone mining machine operators central to the upstream supply chain. The key question is whether growing mine automation -- autonomous haul trucks, remote-operation drill rigs, and AI-assisted blasting systems -- will hollow out operator roles faster than new quarry capacity creates them. Evidence suggests partial automation pressure is real but the transition in Indian quarrying is slow, leaving a window for credentialed operators who upskill into multi-machine and maintenance roles.

51.0 /100

COURSE EMPLOYABILITY SCORE (CES V2)

Uncertain outcomes, scored across all four CES pillars (\$02).

7.5%¹

CAGR: India stone mining and quarrying market 2026-2032 (6W Research)

Rs. 16,300 Cr²

National Critical Mineral Mission budget, Jan 2025 (PIB, GoI)

51 / 100³

CES score for this trade -- Uncertain outcomes band (Lakshya CES)

~50%³

Frey-Osborne computerisation probability for loading machine operators in underground mines

Subject: the "Stone Mining Machine Operator" CTS trade (NSQF Level 3, Engineering category) -- Compiled from the DGT/MSDE program specification + independent third-party research (see Sources).

Can AI or automation replace this job? The honest answer.

Mining automation is real and accelerating globally -- autonomous haul trucks, remote-drill systems, and AI-based blast optimisation are already deployed at large open-cast mines. Yet the deployment gap between global technology demonstrators and the thousands of small-to-medium Indian stone quarries is wide, and the physical unpredictability of quarry environments creates durable demand for human judgment. The honest answer is: partial displacement over the next decade, not wholesale replacement.

The risk, stated plainly

Frey and Osborne's landmark analysis assigned roughly a 50% computerisation probability to loading machine operators in underground mines ³, one of the closest occupational analogues to a stone mining machine operator. The WEF Future of Jobs Report 2025 flags that autonomous robotics and AI are cited by 58% of employers as a top workforce disruptor ⁴, and autonomous haulage systems already claim 20% productivity uplifts and 30% cost reductions at large mining operations globally ⁵. In the Indian context the Confederation of Indian Industry projected a demand-supply gap of over 2,200 skilled mining workers by 2025 ⁶, signalling that even where automation is introduced, human operators remain necessary during transition periods -- and shortage, not surplus, characterises the near-term labour market.

What automates vs what stays human

THE TASKS AUTOMATION IS TAKING

- Repetitive flat-terrain haul-truck driving on well-mapped quarry roads (autonomous haulage systems already proven at scale) ⁵
- Routine production drilling on flat, consistent rock benches where GPS and sensor fusion can replace the operator cabin ⁵
- Basic load monitoring and weighbridge recording via IoT sensors and automated data capture ⁵
- Shift-level blasting calculations and initiation sequencing on standardised bench geometries (software-assisted) ⁴
- Safety perimeter monitoring using drone patrols and AI object-detection cameras instead of manual walkdowns ⁵
- Equipment hour-meter logging and standard maintenance scheduling via CMMS software ⁴

THE WORK THAT STAYS HUMAN

- Operating machines in complex, irregular, or narrow quarry faces where terrain variability defeats autonomous systems -- physical adaptability is the core resilience factor ^{P/5}
- Real-time fault diagnosis and emergency response when a drill string sticks, a crusher jams, or a conveyor trips -- requires trained sensory judgment ^P
- Coordinating blasting operations in proximity to water tables, unstable overburden, or community boundaries under Mines Act/DGMS oversight -- regulatory accountability cannot be delegated to software ⁷
- Maintenance and adjustment of the wide variety of machine types (drillers, loaders, crushers, conveyors) found across India's fragmented small-quarry sector ^{P/6}
- Multi-machine site supervision at medium-scale quarries where one experienced operator oversees several pieces of equipment and junior workers ^P
- Adapting blasting patterns and machine paths to real-time geological variation -- unexpected rock hardness, faults, and wet conditions require human situational judgement ^P

The resilient anchors

2,200+ workers ⁶

Projected skilled manpower shortage in India's mining sector by 2025 -- shortage, not surplus, is the near-term signal

5.7M workers ²

India's target to train mining sector workers by 2030 under the National Critical Mineral Mission -- massive formal upskilling drive

19%_{p.a.} ⁸

Projected annual growth of India mining and construction equipment sector, creating operator demand alongside machine supply

Partial automation risk over 10 years -- but Indian quarry realities and a skilled-worker shortage keep operators in demand through the decade.

The automation trajectory for stone mining machine operators in India is better described as role evolution than role elimination. Large-scale autonomous systems are technically proven ⁵ but their deployment in India's fragmented, small-plot quarrying sector faces cost, infrastructure, and regulatory barriers that will limit reach over the next five to seven years. The 50% computerisation probability from Frey-Osborne ³ applies to the most routine driving and drilling sub-tasks -- it does not mean 50% of operators will be displaced; it means roughly half the task content of the job is theoretically automatable given unlimited investment.

Operators who diversify across machine types, acquire basic maintenance and fault-diagnosis skills, and understand DGMS safety compliance will be the last to be displaced and the first hired as quarry modernisation creates demand for workers who can bridge human oversight and machine systems ^P. The Lakshya CES places this trade at 51/100 (Uncertain outcomes), accurately reflecting that demand exists but formal placement evidence is thin and salary realization is unclear -- exactly the profile of a trade where credential quality and continuous upskilling determine individual outcomes.

Automation exposure by task

Task in this trade	Automation risk	How this trade / program is positioned
Flat-terrain haul truck operation on standard quarry roads	High	Autonomous haulage systems already deployed at large mines globally; less immediately at small Indian quarries ⁵
Routine production drilling on consistent bench geometry	High	GPS-guided automated drill rigs viable on flat, well-characterised benches ⁵
Equipment hour and production data logging	High	IoT sensors and CMMS software replace manual logbooks in modernising operations ⁴
Operating equipment on irregular, complex, or narrow quarry faces	Lower	Terrain variability defeats autonomous systems; human adaptation required ^{P/5}
Crusher, conveyor, and screen operation and adjustment	Moderate	Some PLC automation possible but real-time material variation requires operator intervention ^P
Blasting operations and DGMS-regulated safety compliance	Lowest	Regulatory accountability and site-specific risk assessment remain human responsibilities ⁷
Equipment fault diagnosis and breakdown response	Lower	Predictive maintenance tools assist but field diagnosis and repair remain human ^P
Multi-machine supervision at medium quarries	Lowest	Experienced operators move into supervisory roles as quarries modernise ^P

How to read these numbers. Automation probability figures (including the 50% Frey-Osborne estimate ³) measure theoretical task susceptibility under ideal technology conditions, not near-term job loss rates. They are derived from US occupational data and may overstate risk in India's quarrying context, where small quarry scale, capital constraints, and regulatory complexity slow technology adoption. Use them as a directional indicator for which sub-skills to prioritise upskilling in, not as a headcount forecast.

02 THE COURSE EMPLOYABILITY SCORE (CES)

How this trade scores on Lakshya's employability metric

Lakshya's Career Employability Score (CES) for the Stone Mining Machine Operator trade stands at 51 out of 100, placing it in the Uncertain outcomes band (40-59), which carries a recommended financing posture of Reduced exposure with safeguards. This mid-range score reflects a trade with genuine sector tailwinds and solid government policy backing -- but constrained by very thin live-hiring signal (1 active listing, 2 employers in the aggregated data), low placement-outcome confidence, and moderate market-dynamics scores weighed down by weak live demand evidence. Scored on the evidence in this report, this role earns a **CES of 51.0 / 100, "Uncertain outcomes."**

CES Pillar (CES v2)	Weight	What it measures
Training Quality	0.30	Regulatory recognition and licensure of the qualification
Market Dynamics	0.30	Demand, salary band, sector trajectory, automation possibility and displacement risk
Placement Outcome	0.25	Whether the market actually hires this role: live employers, openings, pay and recency
Government Support	0.15	Migration pathways, federal frameworks and policy backing the role

Score bands: ≥80 High employability (full financing exposure) · ≥60 Moderate · ≥40 Uncertain outcomes · below that Weak job linkage. Framework: CES v2.

Market Dynamics, by sub-signal

Sub-signal	Score/100	Sub-weight	Conf
Demand	7	0.40	0.65
Salary (vs country floor)	60	0.30	0.08
Sector trajectory	80	0.15	0.88
Automation possibility	50	0.10	0.30
Displacement risk	50	0.05	0.30
Market Dynamics composite	40	n/a	0.46

The four pillars, scored

CES pillar	Score	Conf	Weight	Evidence
Training Quality	65	0.95	0.300	Training quality scores 65/100 with high confidence (0.95) -- the DGT-issued CTS 2.0 curriculum at NSQF Level 3 is nationally standardised and formally recognised ^P .
Market Dynamics	40	0.46	0.300	Market dynamics scores 40/100 with moderate confidence (0.46) -- sector growth is real (7.5% CAGR ¹) but live salary and demand signals for this specific operator role are weak, with salary sub-score at 60 and demand sub-score at 7 out of 100.
Placement Outcome	36	0.04	0.250	Live market hiring of the role: 1 openings · 2 employers · 1 with pay · 7 recent postings
Government Support	70	0.90	0.150	Government support scores 70/100 with high confidence (0.90) -- the National Critical Mineral Mission (Rs. 16,300 crore, Jan 2025 ²), MSDE-NSDC skilling mandates, and DGMS regulatory framework all provide strong structural backing ⁷ .

Composite (applied weights, renormalised over scored pillars): **65×0.30 + 40×0.30 + 36×0.25 + 70×0.15 = 51.0**. Confidence 0.88 · evidence 7 clean / 0 rejected · 6 sources.

COURSE EMPLOYABILITY SCORE (CES V2)

51.0 / 100, "Uncertain outcomes"

The 51/100 score is driven by a high-confidence training quality score (65), strong government support (70), and a sector sub-score of 80 -- but these are offset by an extremely low placement-outcome score (35.6) caused by near-absent formal placement data (1 listing, employer_breadth component at 18 out of 100). The market_dynamics pillar at 40 reflects the reality that while the stone quarrying sector is growing, aggregated job-board demand for this specific CTS designation is structurally thin: most hiring happens through informal networks, contractor channels, and site referrals that job boards do not capture.

A graduate can target a higher effective employment outcome by combining the NTC certificate ^P with supplementary credentials in blasting safety (DGMS certification) and equipment-specific endorsements, applying directly to infrastructure contractors and quarry lessees rather than through general job portals, and targeting states with active quarrying -- Rajasthan (marble/granite), Andhra Pradesh, Karnataka, and Madhya Pradesh -- where informal placement networks are stronger than online listings suggest ^{8/P}.

Sector demand is real; formal job-board signal for this specific role is thin.

India's stone quarrying sector is a material part of the construction supply chain and is growing. The challenge for this trade is not absence of demand for the underlying labour but near-absence of formal recruitment infrastructure -- most quarry operators hire through site referrals and contractor networks.

The India stone mining and quarrying market is projected to grow at a CAGR of 7.5% from 2026 to 2032, driven by urban infrastructure, housing, and export demand for Indian granite and marble ¹. India's natural stone market generated USD 709 million in 2024 and is forecast to reach USD 1.06 billion by 2030 at a 7.1% CAGR ⁹. The broader construction sector is expected to grow at 11.2% in 2025 and employ 100 million workers by 2030 ¹⁰, creating sustained upstream demand for quarried stone. Mineral production value reached an estimated Rs. 1,71,460 crore in 2025-26 ⁸, reflecting the scale of the extractive sector that stone operators serve. The National Critical Mineral Mission, launched January 2025 with Rs. 16,300 crore in government outlay and an additional Rs. 18,000 crore from PSUs ², will drive new exploration and quarrying activity -- with a target of training 5.7 million mining workers by 2030 ². India's mining sector employed nearly 1.3 million people in FY2023 ¹¹, and the Confederation of Indian Industry identified a demand-supply gap of over 2,200 skilled workers by 2025 ⁶, confirming that supply constraints -- not demand weakness -- are the operative problem.

7.5% CAGR¹

India stone mining and quarrying market 2026-2032 -- sustained sector growth underpins operator demand

1.3M workers¹¹

India mining sector employment FY2023 -- large base workforce in the broader sector

70,000 jobs²

Expected new jobs from the critical minerals recycling scheme under NCMM alone

04 LIVE HIRING EVIDENCE (2025/26)

What employers are actually posting

Captured from live job boards (Indeed, LinkedIn, Naukri) in the current scrape window: **1** openings across **2** employers, **1** with disclosed pay, **7** recent. These are real postings.

The live-hiring aggregate for this trade is very thin: 1 active listing from 2 employers, with 1 listing carrying salary data and 7 recent signals. The one confirmed employer (DKT Infra and Developers Pvt Ltd, Una, Himachal Pradesh) offered Rs. 25,000-40,000/month for an experienced mechanical operator at a stone crusher site, consistent with mid-experience market rates. This scarcity of online listings is structural, not a sign of sector weakness -- quarry hiring in India is predominantly informal, through site supervisors, word-of-mouth, and contractor networks.

Employer (live posting)	Posts	Disclosed pay	What they want
DKT INFRA & DEVELOPERS PVT. LTD.	1	INR 25,000/mo (one posting)	**We are Hiring** **Mechanical Operator** **Location:** Una **Salary:** ₹25,000-₹40,000 per month (Salary depend on Exp and skills) **Experience Requi

Employer names and counts are from live job boards in the current window; counts fluctuate daily and are date-stamped in the engine. This sample is smaller than a mature occupation's; the scraper is being scaled to widen coverage.

THE SIGNAL IN THE DATA

- 1 confirmed job listing at Rs. 25,000-40,000/month for a mechanical operator at a stone crusher (5-8 years experience) -- provides a real salary anchor for experienced operators
- 2 employers captured suggests the trade is genuinely niche in formal job-board terms, even though underlying sector demand is strong
- 7 recent signals in the aggregated data indicate the trade is not entirely absent from formal channels, just lightly represented

WHY THIS MATTERS

- Target states with active quarrying clusters: Rajasthan (marble, granite, sandstone), Andhra Pradesh, Karnataka, Tamil Nadu, Madhya Pradesh -- where site-level recruitment is routine and continuous ^{1/9}
- Apply directly to infrastructure project contractors and quarry lessees via NSDC's NCS portal, ITI placement cells, and mining industry associations rather than general job boards ^{6/P}
- Register with state mining departments and quarry associations: many states maintain operator panels for lease-holders who need to demonstrate compliance with Mines Act staffing requirements ⁷

Bottom line: Online listings severely undercount actual demand for this trade; the operative strategy is direct contractor outreach and state-level mining network engagement, not job portal applications.

05 ROLES, PATHWAYS & EARNING POTENTIAL

What the trade leads to, and what it pays

The Stone Mining Machine Operator CTS trade (NSQF Level 3, 1 year) is a structured entry into mining machine operations with clear upward pathways into supervisory, maintenance, and contractor roles as experience accumulates.

Role this prepares for	Indicative pay in India	Automation resilience
Stone Mining Machine Operator (entry/ITI fresher)	Rs. 15,000-22,000/month ¹²	Entry -- build multi-machine breadth quickly
Experienced Stone Crusher / Quarry Machine Operator (3-5 yrs)	Rs. 25,000-40,000/month [employer data]	Resilient -- machine complexity and site knowledge are non-trivial
Quarry Shift Supervisor / Site Foreman	Rs. 35,000-55,000/month ¹²	Resilient -- oversight role that automation enables rather than replaces
Mining Machine Maintenance Technician (with additional cert)	Rs. 40,000-65,000/month ¹³	Strong -- maintenance is a known automation-resistant function
Blasting Foreman / Shot Firer (DGMS certificate)	Rs. 30,000-60,000/month ^{7/12}	Strongest -- regulated, safety-critical, cannot be delegated to machines

PHASE 1 Foundations (ITI Year, NSQF L3) Complete the DGT-CTS Stone Mining Machine Operator curriculum: drilling machine operation, blasting fundamentals, crusher and conveyor operation, basic maintenance, mines safety legislation, and site surveying basics ^P. Aim for top grades to access NCVT certification and maximise NTC credential quality.	PHASE 2 On-Site Diversification (Years 1-3) Join a quarry or infrastructure contractor and deliberately rotate across machine types -- drill rigs, loaders, primary crushers, secondary crushers, conveyors -- to build multi-machine breadth. Pursue Apprenticeship Act registration if available to formalise site learning. Apply for DGMS Blasting Certificate at first eligibility (typically 2 years experience in blasting operations) ⁷.	PHASE 3 Specialisation and Leverage (Years 4-8) Move into shift supervision or equipment maintenance roles. Consider advanced certification in Mine Management (DGMS First/Second Class Certificate of Competency) or a Diploma in Mining Engineering through lateral entry. Target quarry operations feeding major infrastructure contracts -- cement plants, highway projects, real estate developers -- where scale and formality allow better pay and conditions ^{2/P}.
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06 SKILLS BUILT & WHY THEY'RE AI-RESILIENT

Trained for the floor, not just the test

WHAT CANDIDATES ACTUALLY WORK ON

- Operation of drilling machines, blasting equipment, loaders, and crushing/conveying plant under varied geological conditions ^P
- Mines Act and DGMS safety compliance: statutory self-rescuers, hazard identification, PPE protocols, and emergency response ^{P/7}
- Equipment pre-use inspection, routine maintenance (lubrication, filter changes, wear checks), and fault identification ^P
- Reading site plans, bench layouts, and blast hole patterns; basic use of survey instruments ^P
- Production record-keeping, shift handover, and co-ordination with drilling, blasting, and transport teams ^P

WHY THESE RESIST AUTOMATION

- Multi-machine versatility: operators who can run drill rigs, loaders, crushers, and conveyors are harder to automate out because each machine type requires separate automation investment ^{5/P}
- DGMS-regulated competencies (blasting, safety supervision): statutory human accountability is built into mine legislation and cannot be automated away ⁷
- Equipment maintenance and field troubleshooting: predictive systems flag issues but hands-on diagnosis and repair remain human tasks ^P
- Geological adaptability: real-time response to unexpected rock conditions, water ingress, or overburden instability is beyond current autonomous systems at Indian quarry scales ⁵
- Supervisory communication and team co-ordination: directing contract labour, communicating with site engineers, and managing shift safety briefings require interpersonal skills AI cannot replicate ⁴

The positioning in one line: A certified Stone Mining Machine Operator with multi-machine breadth and DGMS safety credentials occupies an automation-resistant niche in India's growing quarrying sector.

07 THE CREDENTIAL & QUALITY LAYER

The NTC certificate (NSQF Level 3) is your formal entry credential -- stack DGMS safety certifications on top to maximise job security.

Graduates of the DGT-CTS Stone Mining Machine Operator trade who pass the NCVT-conducted All India Trade Test receive the National Trade Certificate (NTC) at NSQF Level 3 ^P. This credential is issued by the Directorate General of Training under the Ministry of Skill Development and Entrepreneurship and is recognised across India for employment and further education purposes. It satisfies the minimum qualification requirement for operating mining machinery at quarry sites regulated under the Mines Act, 1952, and DGMS rules ⁷.

The NTC functions as a stackable base: graduates can add DGMS Blasting Certificates (Shot Firer, Blasting Foreman), first aid certifications, equipment-specific operator endorsements, and eventually apply for DGMS Certificates of Competency in Mine Management. In a sector where informal hiring is common, holding a formally issued government credential differentiates a candidate from unskilled casual labour, signals minimum safety awareness to site managers, and improves access to organised-sector contractors who require documented qualifications for statutory compliance ^{2/P}.

08 THE INDIA TALENT CONTEXT

Abundant graduates, scarce job-readiness

India's broader vocational training ecosystem faces well-documented challenges: the India Skills Report 2025 projects overall graduate employability at 54.81%, with ITI-stream graduates improving to 45.95% employability from 41% in the prior year -- a positive trend but still far below Germany or Singapore's 80-90% vocational placement rates ¹⁴. The mining sector compounds this with its own structural issue: most quarry employment happens outside formal recruitment channels, meaning ITI graduates with mining trades face a larger gap between credential and first job than graduates entering sectors with organised HR infrastructure. Only 48% of ITI seats were filled in 2022, indicating incomplete awareness of vocational pathways ¹⁴.

An NTC certificate in Stone Mining Machine Operator is necessary but not sufficient: placement depends on proactive outreach to quarry operators and contractors, not passive job-board registration ^{P/14}.

09 STAYING FUTURE-READY

How a candidate stays on the resilient side

LEAN INTO

- Obtain the DGMS Blasting Certificate (Shot Firer level) as soon as eligible -- it is legally required for blasting work and materially reduces substitutability ⁷
- Learn basic preventive maintenance and condition-monitoring for the machines you operate; as IoT sensors are added to equipment, operators who understand the data outputs will become site-level asset
- Develop competency on at least three distinct machine types (drill, loader, crusher) to become indispensable at medium-sized quarries that cannot afford specialised single-machine operators ^{5/P}
- Track the National Critical Mineral Mission's exploration and new-quarry pipeline -- new greenfield sites will need trained operators with no prior incumbents to displace ²
- Build knowledge of environmental and mining regulations (DGMS, MoEF clearance requirements) -- compliance skills are increasingly valued and not taught informally ⁷

AVOID BEING DEFINED BY

- Staying narrowly competent on a single machine type (e.g., only crusher operation) -- single-machine operators are most vulnerable when that equipment is upgraded to a semi-autonomous model ⁵
- Relying solely on general job portals for employment -- quarry hiring is relationship-driven; build direct connections with site engineers and regional contractor networks ⁶
- Ignoring safety certification pathways (DGMS, first aid, mine rescue) -- non-certified operators are excluded from organised-sector projects and PLI-linked infrastructure contracts ^{7/2}
- Assuming the trade provides long-term security without upskilling -- the automation trajectory for routine machine operation is upward; stagnation in core-only skills increases displacement risk over a 7-10 year horizon ^{3/5}

10 SOURCES & CITATIONS

Every figure, traced to a source

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