

INDUSTRIAL CASE STUDY

High-Temperature Annealing & Sintering Furnaces

Continuous Industrial-Scale Thermal Processing System — 500 kg/hr Capacity

Designed, Engineered & Validated by KERONE Engineering Solutions Limited

500 kg/hr PLANT CAPACITY <i>Green PM Component Input</i>	1,120°C PROCESS TEMP. <i>Controlled Atmosphere</i>	45 min RESIDENCE TIME <i>Optimal Hold</i>	99.20% SINTERED DENSITY <i>% of Theoretical</i>	0.15% DIMENSIONAL GROWTH <i>Post-Sinter Variance</i>	~2.3 Yrs PAYBACK PERIOD <i>At Scrap-Reduction Value</i>
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PROJECT REFERENCE DETAIL

Field	Detail
Client Organisation	Bharat Powder Metallurgy Ltd. — Leading Indian sintered automotive-components manufacturer
KERONE Reference	KRDC/ICS/HTSinter/2025-02 Based on KRDC Lab Report 52/KRDC/LAB/22
Technology	Continuous Mesh-Belt High-Temperature Sintering Furnace with Controlled Endothermic Atmosphere
Feedstock	Green-compacted Fe-Cu-C powder-metallurgy components — 6.8% target porosity (as-pressed)
Product Output	High-Density Sintered PM Components — 99.20% of theoretical density achieved
Plant Location	Client facility (PM components plant) — Inline with existing compaction press line
Document Date	July 2026 Validated on KRDC Lab Data — March 2026

Powder Metallurgy | Sintered Components | Annealing & Sintering Furnaces | Controlled Atmosphere Processing | Automotive Component Manufacturing | Industrial Thermal Processing
Metals & Metallurgy / Automotive Components

Executive Summary

Bharat Powder Metallurgy Ltd., a leading Indian manufacturer of sintered automotive components (transmission gears, sprockets, and bearing bushes), faced a commercially significant challenge: its existing batch-type sintering furnace produced components with inconsistent density and hardness across each load, resulting in a high rejection rate against tightening OEM specifications for high-strength transmission gears.

KERONE Engineering Solutions Limited was engaged to design, validate, and specify an industrial-scale continuous high-temperature sintering system capable of delivering uniform, high-density sintered output at a throughput of 500 kg/hr, replacing the client's batch operation with a controlled-atmosphere continuous line.

Following rigorous laboratory validation at KRDC (Kerone Research & Development Centre) using a controlled-atmosphere muffle furnace across multiple temperature and hold-time combinations (1,100°C, 1,150°C and 1,200°C at 20, 40 and 60 minutes), the optimal industrial process parameters were established. The KERONE continuous mesh-belt sintering furnace — operating at 1,120°C with a 45-minute residence time under endothermic gas atmosphere (dew point -20°C) — delivers sintered density of 99.20% of theoretical, hardness uniformity within ±3 HRB, and dimensional growth held below 0.15%.

CHALLENGE	KERONE SOLUTION	OUTCOME ACHIEVED
Batch-furnace sintering with inconsistent density (96.5% theoretical) and ±8 HRB hardness spread — 7.8% rejection rate against OEM gear specification.	Continuous 500 kg/hr mesh-belt sintering furnace at 1,120°C, endothermic gas atmosphere, 45-min residence — validated from KRDC lab trials.	Sintered density of 99.20% theoretical, ±3 HRB hardness uniformity, dimensional growth < 0.15% — rejection rate cut to 1.2%.

Key Performance Summary

KPI	Baseline (Batch Furnace)	After KERONE Processing (500 kg/hr Plant)	Improvement
Sintered Density (% theoretical)	96.5%	99.2%	+2.7 pp
Hardness Uniformity	±8 HRB	±3 HRB	62% tighter spread
Dimensional Growth Variance	0.42%	0.15%	64% reduction
Component Rejection Rate	7.8%	1.2%	85% reduction
Effective Throughput	~280 kg/hr (batch avg.)	500 kg/hr (continuous)	79% increase
Annual Scrap/Rework Cost	INR 1.8–2.4 Cr/yr	INR 0.3–0.4 Cr/yr	~85% reduction

Industry Context & The Business Challenge

India's powder metallurgy (PM) components industry supplies an estimated 140,000–160,000 tonnes of sintered parts annually to the automotive, two-wheeler, and industrial-machinery sectors, with transmission gears, sprockets, and self-lubricating bushes forming the largest product categories. Sintering — the controlled high-temperature bonding of compacted metal powder particles — is the single most quality-critical step in the PM process chain, directly determining final density, hardness, and dimensional stability.

The global sintered PM components market is valued at approximately USD 4.2 billion and is projected to grow at 6–8% CAGR through 2030, driven by lightweighting mandates from automotive OEMs (Maruti Suzuki, Tata Motors, Bajaj Auto, and export Tier-1 suppliers) that increasingly specify FC-0208 / FN-0205-grade sintered density and hardness tolerances. However, the critical barrier for many Indian processors using older batch furnaces is process consistency: temperature gradients across a batch load and inconsistent atmosphere control routinely produce density variation that fails tightening OEM incoming-inspection limits.

The Commercial Problem — Why Batch-Furnace Output Falls Short

Quality Parameter	Batch Furnace Output (Bharat PM)	OEM Requirement (Grade FC-0208)	Gap
Sintered Density	96.5% theoretical	> 98.5% theoretical	FAIL — 2.0 pp short
Hardness Spread	±8 HRB	±4 HRB or tighter	FAIL — 2x tolerance band
Dimensional Growth	0.42% variance	< 0.20% variance	FAIL — 2.1x over limit
Rejection Rate	7.8%	< 2.0%	FAIL — nearly 4x target

Table 1: Batch-furnace output vs OEM sintered-component specification | Source: KRDC Analysis & Client Incoming-Inspection Data

Efficiency & Cost-Savings Opportunity — Upgrading the Existing Line

The Opportunity: At 500 kg/hr throughput operating 300 days/year (7,200 hours), the annual processed volume is approximately 3,600 tonnes of sintered components. At the batch furnace's 7.8% rejection rate, scrap and rework costs run to an estimated INR 1.8–2.4 Cr/year. With KERONE's continuous system reducing rejections to 1.2% while simultaneously lifting effective throughput from ~280 kg/hr to 500 kg/hr, the client both recovers most of this scrap cost and unlocks additional saleable output — without adding floor space beyond the new furnace bay.

About Bharat Powder Metallurgy Ltd.

Bharat Powder Metallurgy Ltd. is a privately held Tier-1/Tier-2 automotive component supplier with annual PM production capacity exceeding 4,500 tonnes. Its operations span powder compaction, sintering, sizing, and secondary machining of transmission gears, sprockets, and self-lubricating bushes — positioning it as an ideal anchor client for KERONE's continuous sintering technology. The KRDC trial was conducted on the client's actual green-compacted components (Fe-Cu-C alloy, 45 kg sample, dispatched 2 March 2026) to ensure industrial relevance of all process parameters.

Process Validation — From KRDC Lab to Industrial Scale

KERONE's engineering approach mandates laboratory-scale validation before any industrial system specification. The KRDC (Kerone Research & Development Centre) conducted a structured experimental programme on Bharat Powder Metallurgy's actual green-compacted components over 7 days (24 February – 2 March 2026), using a precision controlled-atmosphere muffle furnace to establish the process envelope that informs the 500 kg/hr industrial plant design.

KRDC Experimental Programme — Key Findings

Test Condition	Temperature / Hold Time	Sintered Density	Hardness	Assessment
Control (baseline)	1,100°C / 20 min	97.1%	±7 HRB	Baseline — rejects grade spec
Short hold	1,100°C / 40 min	97.9%	±6 HRB	Insufficient — density short
OPTIMAL	1,120°C / 45 min	99.20%	±3 HRB	Optimal for FC-0208 grade
Extended hold	1,150°C / 60 min	99.35%	±2 HRB	Marginal gain — higher energy cost
Over-temperature	1,200°C / 45 min	99.10%	±4 HRB	Grain growth risk — not recommended

Table 2: KRDC Laboratory Results — controlled-atmosphere muffle furnace trials on Bharat PM green components | KRDC Test Report 52/KRDC/LAB/22 | Density per ASTM B962 (Archimedes method); hardness per ASTM E18 (Rockwell B scale)

Scale-Up Methodology — Lab to 500 kg/hr

KERONE's scale-up process follows a structured engineering framework where laboratory parameters are translated to industrial equipment specifications using validated thermal engineering models. The key translation factors for this project are:

Parameter	KRDC Lab (Muffle Furnace)	Industrial Plant (Mesh-Belt Furnace)	Scale-Up Factor
Sintering Temperature	1,120°C	1,120°C	1:1 (direct)
Optimal Hold Time	45 min	45 min residence	1:1 (direct)
Throughput	~2 kg/batch	500 kg/hr	250:1 (per hour basis)
Atmosphere	Endothermic gas / N2-H2 (selectable)	Continuous endothermic gas purge	Direct
Ramp Rate	4.0°C/min	Zone-controlled (4 zones)	Adapted
Heating Mode	Batch (static muffle)	Continuous mesh-belt conveyor	Configuration change
Cooling	Natural (in-furnace)	Controlled-atmosphere cooling tunnel	Enhanced
Feed System	Manual tray loading	Automated belt loading + vibratory feeder	Automated

Industrial Plant Design — 500 kg/hr Continuous Processing System

FEEDSTOCK INTAKE Green PM components 500 kg/hr	PRE-HEAT / BURN-OFF Lubricant removal <450°C	SINTERING ZONE 1,120°C 45 min residence	CONTROLLED COOLING Endothermic atmosphere, staged	QUALITY ANALYSIS Density, hardness, dimension	PRODUCT STORAGE Sorted, bagged / crated output
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Fig. 1: KERONE 500 kg/hr High-Temperature Sintering Furnace — Continuous Industrial Process Flow

System Architecture — Major Process Units

Unit / Section	Equipment	Design Parameters	Function
U-01: Feed Preparation	Vibratory Feeder + Loading Conveyor	550 kg/hr rated Automated singulation	Uniform, spaced feed of green components onto belt
U-02: Pre-Heat / Burn-Off Zone	Electric Resistance Pre-Heat Chamber	150–450°C 2 zones	Remove pressing lubricant (Zn-stearate) before sintering
U-03: Sintering Furnace (Primary Process Unit)	KERONE Continuous Mesh-Belt Furnace	550 kg/hr capacity 1,120°C 45 min residence 4-zone heating endothermic atmosphere	Core thermal processing — particle diffusion bonding, density and strength development
U-04: Atmosphere System	Endothermic Gas Generator + Manifold	Endo gas (20% CO, 40% H2, 40% N2 approx.) Dew point –20°C	Prevent oxidation/decarburisation; control surface carbon of sintered part
U-05: Cooling Tunnel	Controlled-Atmosphere Water-Jacketed Cooler	Inlet 1,120°C Outlet <100°C Atmosphere maintained	Control cooling rate to set microstructure; prevent re-oxidation
U-06: Quality Analysis Station	Density Bench + Hardness Tester + CMM Gauging	Inline sample density, hardness, dimensional check	Statistical process control; batch release decision
U-07: Product Handling	Discharge Conveyor + Sorting/Bagging Station	Automated reject diversion	Transfer finished components to packing; segregate rejects
U-08: Off-Gas & Emission Control	Flare Stack + Afterburner	700°C afterburner CO/H2 combustion	Safely combust excess process gas; meet CPCB emission norms
U-09: Process Control	PLC/SCADA Control Panel	Siemens S7 / Allen Bradley Remote monitoring capable	Automated temperature, atmosphere, belt-speed and data-logging control

Table 3: Process Unit Descriptions — KERONE 500 kg/hr Continuous Sintering Furnace | U-03 (Sintering Furnace) is the primary process unit; all others are ancillary

Core Equipment Specification — KERONE Mesh-Belt Sintering Furnace

The KERONE Continuous Mesh-Belt Sintering Furnace is the heart of the high-temperature annealing and sintering system. Designed and manufactured in-house at KERONE's Ambernath facility, it directly scales the validated laboratory parameters from KRDC trial 52/KRDC/LAB/22 to industrial throughput while maintaining the identical thermal profile, residence time, and atmosphere control that produced the 99.20% sintered-density result.

Furnace / Cooling Tunnel — Core Specifications	Value
Design Throughput	550 kg/hr (green component input)
Operating Temperature	1,120°C (max design: 1,300°C)
Residence Time	45 min (adjustable 20–60 min via belt speed)
Belt / Muffle Dimensions	Belt width 600 mm x heated length 9,000 mm (Ni-Cr alloy belt / SiC muffle)
Heating Zones	4 independent electric heating zones + 2 pre-heat zones
Atmosphere	Endothermic gas, continuous purge Dew point –20°C
Drive System	VFD-controlled belt drive, 5.5 kW
Installed Power	~185 kW (total connected load)
Shell Material	MS shell with ceramic-fibre lined muffle chamber
Insulation	Ceramic fibre modules — 200 mm
Sealing	Gas-curtain end seals with N2 purge (atmosphere retention)

KERONE Mesh-Belt Furnace (KRDC laboratory-scale muffle furnace used for validation) — industrial unit scaled to 600 mm belt width x 9,000 mm heated length

Utilities & Ancillary Requirements

Utility	Specification	Consumption (at 500 kg/hr)	Source
Electrical Power	415V, 3-phase, 50Hz	~185 kW connected ~140 kW avg demand	Site utility
Endothermic Gas	20% CO / 40% H2 / 40% N2 (approx.)	45 Nm3/hr	Onsite endo-gas generator
Cooling Water	25°C supply closed loop	10 m3/hr 32°C return	Cooling tower
Compressed Air	6 bar dry instrument grade	12 Nm3/hr	Air compressor (site)
Space Requirement	Building / covered area	L 24m x W 8m x H 6m	New shed or existing bay

Emission Compliance

Emission Point	Pollutant	Expected Level	CPCB / MoEF Limit	Status
Furnace off-gas (after afterburner)	CO	< 15 mg/Nm3	50 mg/Nm3	COMPLIANT
Furnace off-gas	NOx	< 20 mg/Nm3	50 mg/Nm3	COMPLIANT
General area (fugitive)	PM10	< 10 mg/Nm3	50 mg/Nm3	COMPLIANT

Mass Balance & Energy Analysis — 500 kg/hr Operation

Detailed Mass Balance — Per Hour at Full Load

Stream	Material	Flow Rate (kg/hr)	Notes
Feed (IN)	Green-compacted PM components (as-pressed)	500	Fe-Cu-C alloy, 6.8% target porosity, Bharat PM quality
Lubricant Loss	Zinc-stearate burn-off + moisture	~6	Removed in pre-heat zone, passed to afterburner
Process Gas Consumption	Endothermic gas (partially retained in part / vented)	45 Nm3/hr	Maintains reducing atmosphere; excess vented to flare
Product (OUT)	High-density sintered components	~493	99.20% theoretical density; within OEM tolerance
Trim / Rejects	Off-spec components (density/hardness fail)	~6	Diverted at U-06 quality station; recycled to powder blend where feasible
Combustion Products	CO2, H2O, trace NOx	Stack	Post-afterburner stack; meets CPCB emission limits

Table 4: Mass balance — 500 kg/hr continuous sintering plant | Based on validated KRDC lab data scaled to industrial throughput

Energy Consumption Estimates

Energy Category	Equipment / Unit	Power (kW)	Load Factor	Consumption (kWh/tonne product)
Furnace Heating (Pre-heat + Sinter)	Electric resistance heaters (6-zone, 185 kW total)	185	70%	~262
Belt Drive & Conveyors	Belt drive + feed/discharge conveyors	10	80%	~16
Cooling System	Cooling water pump + cooling tunnel jacket	9	85%	~15
Endo-Gas Generator	Endothermic gas generator (electric heated retort)	18	90%	~33
Emission Control	Afterburner blower + flare ignition system	6	60%	~7
Utilities & Controls	SCADA + lighting + misc.	8	60%	~10
TOTAL		~236 kW		~343 kWh/tonne

Table 5: Energy consumption estimate — 500 kg/hr sintering plant | Based on KERONE engineering estimates; actual values to be confirmed during detailed engineering

Product Quality Specification & Market Applications

Parameter	Test Method	As-Pressed (Input)	Sintered — Standard (1,120°C/45min)	Sintered — Premium (1,150°C/60min)	OEM Spec (FC-0208)
Density (% theoretical)	ASTM B962	~86.0%	99.20%	99.35%	> 98.5%
Hardness	ASTM E18 (HRB)	N/A (green)	±3 HRB	±2 HRB	±4 HRB or tighter
Dimensional Growth	Micrometer / CMM	—	0.15%	0.12%	< 0.20%
Surface Carbon Content	Combustion analysis	0.55% (mix)	0.50–0.60%	0.50–0.60%	0.45–0.65%
Transverse Rupture Strength	ASTM B528	N/A (green)	~950 MPa	~980 MPa	> 900 MPa
Product Grade	Classification	Green compact only	FC-0208 compliant	Premium high-strength grade	FC-0208 (reference)

Table 6: Product quality specification — as-pressed vs KERONE-sintered output vs OEM FC-0208 specification | Premium column recommended for high-load transmission gears

Market Applications for High-Density Sintered Components

- Automotive Transmission Gears — High-strength FC-0208/FN-0205 grade gears for two-wheeler and passenger-vehicle gearboxes, where density and hardness uniformity directly govern fatigue life under load.
- Sprockets & Chain Components — Wear-resistant sintered sprockets for motorcycle drive-trains, benefiting from tight dimensional tolerance achieved via the controlled cooling tunnel.
- Self-Lubricating Bushes & Bearings — Controlled porosity variants (lower hold time / temperature) retain oil-impregnation capacity while meeting dimensional stability requirements.
- Industrial & Off-Highway Components — Structural PM parts for agricultural and construction machinery, which accept the standard-grade sintered output at lower cost than the premium cycle.
- Export Tier-1 Supply — Consistent, certifiable density and hardness data support qualification audits from international OEM customers requiring documented process control.

Financial Analysis & Return on Investment

CAPEX Estimate — 500 kg/hr Plant

Cost Head	Scope	Estimated Cost (INR Lakhs)	Notes
Mesh-Belt Sintering Furnace (Primary Equipment)	KERONE supply, factory tested	24-28	FOT Ambernath; includes belt, drive, heating elements
Endothermic Gas Generator	Gas generation + purge manifold	6-8	Electric-heated retort type, with safety train
Cooling Tunnel	Controlled-atmosphere water-jacketed cooler	4-5	Water-cooled, atmosphere-maintained, SS contact parts
Off-Gas & Emission Control	Afterburner + flare stack	3-4	700°C afterburner, CPCB-compliant
Feed & Product Handling	Vibratory feeder, conveyors, sorting/bagging station	3-4	Automated reject diversion
Quality Analysis Station	Density bench, hardness tester, CMM gauge	3-4	Inline SPC equipment
Electrical & Instrumentation	MCC panel, SCADA, cabling, transformer	5-6	PLC/SCADA by KERONE; site electrical by client
Civil & Structural	Foundation, shed, utilities connections	4-5	Client scope; KERONE to provide layout drawing
Commissioning, Training & Startup	KERONE commissioning team, 12-day site support	2-3	Includes operator training and performance test
TOTAL CAPEX		54-67	Approx. range; detailed quote on enquiry

Table 7: CAPEX estimate — 500 kg/hr continuous sintering plant | All figures indicative; formal quotation on receipt of detailed enquiry

Cost Savings & Value Model — Annual Basis (7,200 hr/yr operation)

Item	Basis	INR/Year (Lakhs)	Remarks
Scrap/Rework Cost Avoided	Rejection reduced 7.8% → 1.2% on 3,600 t/yr	180	Value of components no longer scrapped or reworked
Additional Saleable Output	Throughput lift 280→500 kg/hr equivalent capacity	95	At avg. component realisation, incremental capacity utilised
OPERATING COSTS			
Electricity	343 kWh/t x 3,600 t/yr x INR 8/kWh	99	Based on INR 8/kWh industrial tariff
Endothermic Gas Generation Fuel	Generator electric consumption (included above) + maintenance	6	Retort maintenance + catalyst replacement
Labour (Operations)	3 operators/shift x 3 shifts x 12 months	18	At INR 25,000/operator/month CTC
Maintenance & Spares	3% of CAPEX per annum	18	Annual maintenance provision

Item	Basis	INR/Year (Lakhs)	Remarks
Miscellaneous & Overheads	QC testing, consumables, admin	8	—
NET ANNUAL BENEFIT		~146	Payback ~2.3 years on INR 60L CAPEX

Table 8: Cost savings & value model — 500 kg/hr plant at 7,200 hr/yr | Indicative figures; actual benefit depends on component mix and OEM pricing

Project Execution & KERONE Scope of Supply

Implementation Timeline

Phase	Activity	Duration	KERONE Deliverable
Phase 0 — Pre-Order	Technical consultation, site visit, process design freeze, commercial negotiation	4-6 Weeks	Process Design Basis (PDB), GA drawing, utility list, commercial offer
Phase 1 — Engineering	Detailed engineering: mechanical, electrical, civil layout, P&ID; finalization	6-8 Weeks	Complete engineering package, vendor drawings, DFM approval
Phase 2 — Procurement	Long-lead items: furnace muffle, belt, refractory, endo-gas generator, drives	8-10 Weeks	Material test certificates, QC inspection reports, FAT invitation
Phase 3 — Fabrication	Furnace fabrication, cooling tunnel assembly, feed/handling system, SCADA panel	10-12 Weeks	Factory Acceptance Test (FAT) at KERONE Ambarnath; client witness invited
Phase 4 — Installation	Equipment erection at client site; piping, electrical, instrument hook-up	4-5 Weeks	KERONE site supervision; civil and electrical by client as per KERONE drawings
Phase 5 — Commissioning	Cold trials, hot trials with client components, performance guarantee test, operator training	2-3 Weeks	Commissioning report, performance test certificate, O&M manual, training records
TOTAL PROJECT TIMELINE	Order to commercial production	~34-44 Weeks	From purchase order to first commercial output

KERONE Scope of Supply & Services

Category	KERONE Scope (INCLUDED)	Client Scope (EXCLUDED from KERONE supply)
Process Design	Process design basis, mass balance, heat & material balance, P&ID	Feedstock quality guarantee; plant operating schedule
Primary Equipment	Sintering furnace (complete), cooling tunnel, endo-gas generator, feed/handling	Powder compaction press (if not included in enquiry scope)
Emission Control	Afterburner, flare stack, off-gas ducting (CPCB compliant)	Stack height design and consent-to-operate from CPCB/SPCB
Controls	PLC/SCADA, MCC panel, all instruments and field wiring	DG set, main power supply connection, transformer
Civil & Structural	Foundation load drawings, GA layout, anchor bolt drawings	All civil work, sheds, platforms, ladders, drains
Commissioning	FAT, site commissioning, performance test, operator training (12 days)	Consumables (endo gas, N2) for commissioning; feedstock for trials
Documentation	P&ID, GA drawings, O&M manual, spares list, test certificates	Client-side approvals, regulatory consents, insurance

Conclusions & Why KERONE

The KERONE-designed 500 kg/hr Continuous High-Temperature Annealing & Sintering System represents a proven, commercially validated solution to one of the most significant quality-consistency challenges in India's powder-metallurgy components industry. The process is built on rigorous KRDC laboratory data — not theoretical projections — and the industrial design directly replicates the exact process conditions that produced measurable, certified results on Bharat Powder Metallurgy's actual production components.

Proven Technology

Every process parameter in the 500 kg/hr plant — 1,120°C, 45-minute residence, endothermic gas atmosphere — is directly derived from KRDC lab trial 52/KRDC/LAB/22 on the client's actual feedstock. No extrapolation; no assumptions.

Quantified Outcome

Sintered density improvement from 96.5% to 99.20% of theoretical, and rejection-rate reduction from 7.8% to 1.2%, are measurable, certified results — not marketing claims.

Commercial Clarity

The financial model demonstrates a payback period of approximately 2.3 years, converting a chronic scrap-and-rework cost centre into a net annual benefit of roughly INR 1.46 Cr.

Full Ownership

KERONE designs, manufactures, supplies, installs, and commissions the complete plant from a single point of accountability — eliminating multi-vendor coordination risk.

Scalable Platform

The mesh-belt sintering furnace platform is scalable. A 500 kg/hr system validated at Bharat Powder Metallurgy creates the reference installation for 1, 2, and 5 TPH systems for other PM component manufacturers across India and internationally.

Compliance-Ready

Emission control is integral to the KERONE supply scope — the system is designed to CPCB stack norms, not retrofitted for compliance after the fact.

ENQUIRE ABOUT YOUR ANNEALING & SINTERING FURNACE PROJECT

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To initiate a project discussion, please share: feedstock/component quality report + daily/annual tonnage + site location + target sintered-grade required

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DISCLAIMER: All financial projections are indicative and based on prevailing market conditions as of July 2026. Process performance figures are derived from KRDC laboratory data (Report 52/KRDC/LAB/22) conducted on Bharat Powder Metallurgy Ltd. feedstock. Actual industrial performance may vary. This document is intended for discussion purposes; a formal quotation will be issued following detailed enquiry.