GME Recycling

TECHNICAL WHITEPAPER

Rotary Kiln Decoating for Aluminium Recycling

Engineering Parameters, Process Integration and Performance Evaluation



Executive Summary

Rotary kiln decoating is used to remove paint, lacquer, oil, grease and other organic contaminants from aluminium scrap before melting. For operators and engineering teams, the objective is to improve melting performance, reduce dross generation and integrate pre-treatment efficiently into the recycling line.

Feedstock challenge

- Coated scrap
- Oily turnings
- Mixed geometries
- Contamination variability

Process objective

- Cleaner input to melting
- Better heat management
- Reduced oxidation risk
- Smoother downstream handling

Engineering focus

- Feed characterization
- Throughput
- Energy balance
- Gas treatment
- Line integration



This whitepaper covers

- Process fundamentals
- Suitable scrap streams
- Equipment and layout
- RFQ and evaluation checklist

GME Recycling

TECHNICAL WHITEPAPER

Suitable Aluminium Scrap Streams

The ideal process design depends on contamination type, geometry, bulk density and organic load. Different scrap families call for different considerations in feeding, heat transfer and downstream melting.

- Coated & painted
- Oily
- Mixed clean
- Profiles, castings & extrusion





Window Profiles scrap



UBC (Used Beverage Cans) scrap



Tense (casting, wheels, carter) scrap



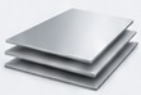
Rod/Wire scrap



Engine blocks scrap



Casting scrap



Offset Sheet scrap



Extrusion (Tutu) scrap



Taint Tabor scrap



Baled Commercial Pure (Taboo) scrap



Mixed Clean (Toto) scrap



Pure Coil scrap



Clean scrap



Oil contaminated Turnings (Telic, Chippings) scrap



Clean Turnings (Teens, Chippings) scrap

How Rotary Kiln Decoating Works

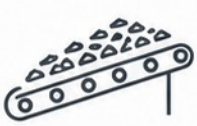
The process is based on thermal pre-treatment that removes organic contaminants from aluminium scrap. Depending on feedstock, combustible organics can contribute to an auto-thermal regime through controlled gas handling and recirculation.

Typical evaluation topics

- Residence time
- Heat transfer
- Gas temperature
- Pressure control
- Emission treatment
- Downstream compatibility

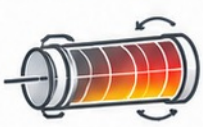


1 Feeding & preparation



Aluminium scrap is fed, metered and prepared (e.g., sized and decontaminated).

2 Kiln heat-up and pyrolytic removal of organics



The rotating kiln heats the scrap, vaporising and removing organic contaminants (pyrolysis).

3 After-burner combustion



Pyrolysis gases are fully combusted in an after-burner at elevated temperature.

4 Heat exchange and gas recirculation



Hot off-gas transfers heat to the process (e.g., air or recirculated gas), improving energy efficiency and enabling auto-thermal operation.

5 Dedusting and transfer to melting



Off-gas is dedusted (e.g., cyclone and/or filter), and the decoated aluminium is discharged to the melting process.



Why Choose GME Technology



01

Closed-loop auto-thermal process

- Organics may contribute as fuel.
- Controlled after-burner zone.
- Recirculating gases help heat the scrap again.



02

Oversize scrap allowed

- Input size up to 250 mm.
- Less need to heavily reduce scrap size.
- More organics on the surface can support the process.



03

Zero oxidation approach

- Rapid heating strategy.
- Mixing and screening support clean output.
- Objective is a bright, clean scrap for melting.

Plant sizes

From 5 TPH UBC up to 20 TPH UBC

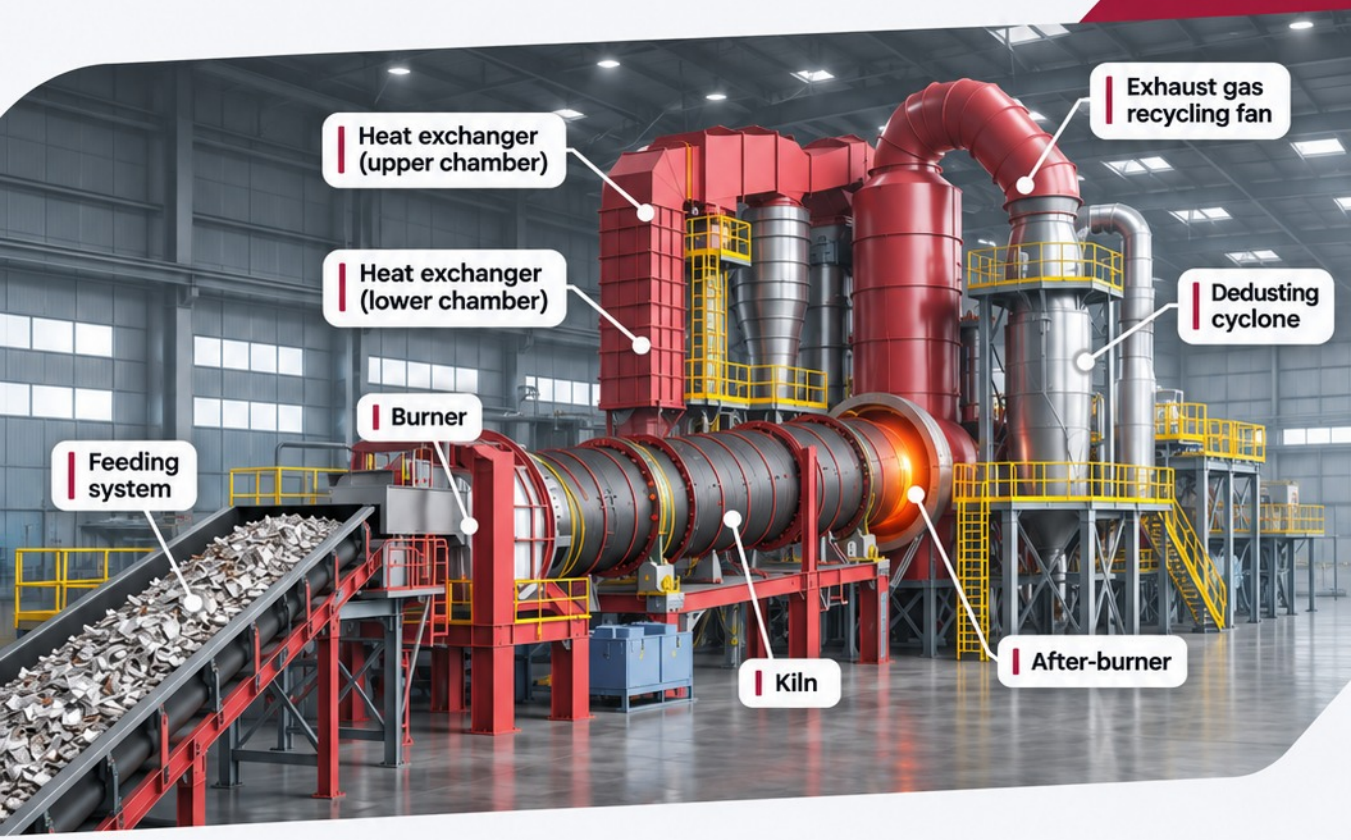
Scalable pre-treatment with de-bailing and hammer mill options.

GME Recycling

TECHNICAL WHITEPAPER

Decoater View: Main Equipment

The decoating line combines thermal treatment, gas handling and dust control in an integrated layout. Clear equipment definition is essential for feasibility studies, layout engineering and RFQ preparation.



Compact integration

Thermal treatment, heat recovery and dust control in a space-efficient layout.

Access for maintenance

Key equipment arranged for safe, efficient inspection and servicing.

Control and automation

Integrated control of temperature, airflow and emissions for stable, efficient operation.

Connection to downstream melting

Clean, decoated aluminium output ready for transfer to the melting line.

GME Recycling

TECHNICAL WHITEPAPER

Plant Integration and Operating Parameters



Throughput Range
From 5 TPH UBC up to 20 TPH UBC (reference scale).

Scrap Size
Up to 250 mm where applicable.

Feed Preparation
De-baling, fines/dust detection, hammer mill options.

Process Control
Temperature, oxygen, pressure and gas recirculation management.

Downstream Compatibility
Connection to melting furnaces and casting options.

Every line must be configured around the actual scrap mix, organic load, utilities and plant objectives.

Environmental and Process Benefits



Efficient

Organic residuals removed from aluminium can be reused as fuel for an auto-thermal process, depending on feedstock and conditions.

Performant

Cleaner metallic fractions can support better smelting performance and lower dross creation.

Eco-friendly

After-burners, dedusting systems and acid gas treatment help reduce emissions.

Air pollution control

- Bag filters;
- HCl, SOx and HF removal with lime or sodium bicarbonate;
- Quenching to help prevent dioxin formation.

Actual performance depends on scrap composition, operating conditions and final plant configuration.

GME Recycling

TECHNICAL WHITEPAPER

Technical Selection & RFQ Checklist

1. Feedstock profile

- [ ] Scrap families (e.g., turnings, punchings, mixed)
- [ ] Organics (type and typical content)
- [ ] Particle size (range and distribution)
- [ ] Bulk density (typical and range)

2. Capacity & operations

- [ ] Hourly throughput (t/h or kg/h)
- [ ] Availability targets (e.g., ≥ 8,000 h/year)
- [ ] Campaign logic (continuous or batch, material mix)
- [ ] Utility constraints (e.g., power, fuel, water, air)

3. Process and emissions

- [ ] Heat source (e.g., natural gas, LPG, electric, other)
- [ ] Gas treatment (e.g., thermal oxidation, scrubber)
- [ ] Dust control (e.g., cyclone, bag filter)
- [ ] Emission limits (applicable regulations and values)

4. Integration

- [ ] Upstream preparation (e.g., sorting, shredding, drying)
- [ ] Downstream melting (e.g., furnace type and interface)
- [ ] Layout constraints (footprint, height, tie-ins, expansion)
- [ ] Automation (control system, data, plant integration)

5. Reliability & maintenance

- [ ] Wear parts (key components and expected life)
- [ ] Access (for inspection, replacement, and cleaning)
- [ ] Redundancy (critical equipment and buffer strategy)
- [ ] Serviceability (maintenance approach and intervals)

6. Project and supplier scope

- [ ] Engineering (basic and detailed, according to scope)
- [ ] Installation (supervision and site support)
- [ ] Commissioning (cold and hot, performance validation)
- [ ] Training (operation and maintenance)
- [ ] After-sales support (spares, remote support, service)

Questions to ask before requesting an offer

1. Is our feedstock (quality, size, and organics) consistent and well characterized?
2. What performance (capacity, availability, and emissions) must be contractually guaranteed?
3. What are the key integration, site, or utility constraints?
4. What scope do we expect from the supplier (from engineering to long-term support)?

GME Recycling

TECHNICAL WHITEPAPER

Ready to Evaluate Your Aluminium Decoating Project?

Whether you are planning a new aluminium recycling line, upgrading an existing plant or comparing decoating technologies, a structured technical assessment helps define the right process solution.



New plant concept

Plant upgrade / retrofit

Technology evaluation & RFQ

Suggested next step

- Share scrap mix and target throughput.
- Define utilities and emission requirements.
- Review integration with melting and casting.

GME Recycling
Aluminium Scrap Processing Solutions
www.gme-recycling.com