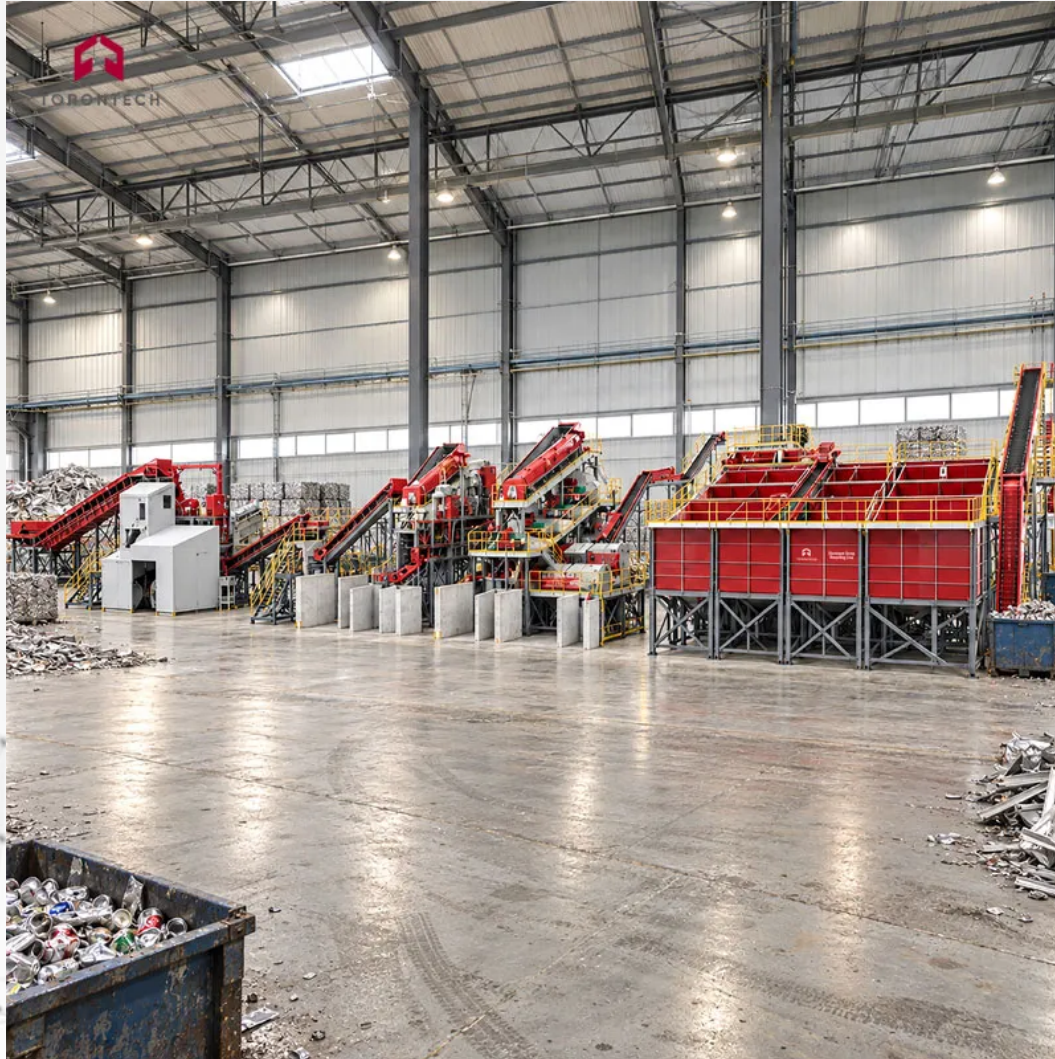




ALUMINUM SCRAP RECYCLING LINE

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The Aluminum Scrap Recycling Line shreds and sorts mixed aluminum scrap (extrusion cut-offs, profile, sheet, castings, mixed post-consumer, and light industrial aluminum) into clean aluminum, ferrous, non-metal, and heavy-metal fractions. The system serves aluminum smelters, remelters, extrusion recyclers, and large scrap yards that process aluminum-dominant feedstock at industrial throughput.

The Aluminum Scrap Recycling Line combines hammer mill primary shredding with a full recovery train: trommel classification, flip-flow screening for the damp or sticky fraction, air classification, top-fed magnetic drum separation, multi-stage eddy current separation (standard rotor plus high-frequency variant), and X-ray transmission sorting for final quality upgrade. This layered flow lifts aluminum recovery yield to 95 to 98 percent under normal input conditions and delivers a smelter-ready flake concentrate.

The line supports customer-specific throughput from 3 to 30+ t/h and adapts to varied input formats (loose extrusion scrap, mixed baled aluminum, profile cut-offs, and light industrial mix). Primary shredding is configurable as a hammer mill (standard for aluminum scrap), twin-shaft plus single-shaft (for baled or contaminated feed), or vertical hammer mill (compact footprint or profile-heavy input). Optional buffer silo storage between shredding and downstream sorting allows batch-mode operation and material blending.

APPLICATIONS

Applications

The Aluminum Scrap Recycling Line targets aluminum-dominant scrap streams that require size reduction plus multi-stage recovery.

- **Aluminum Extrusion Scrap Reclamation:** processes profile cut-offs, extrusion tails, and manufacturing rejects into clean flake for closed-loop remelting
- **Aluminum Profile Recycling:** handles window and door profile scrap, structural extrusion, and other geometric aluminum
- **Aluminum Sheet and Coil Scrap:** reduces sheet trim, coil edge, and stamped part rejects to sortable flake
- **Mixed Aluminum Scrap Yards:** sorts co-mingled aluminum feedstock into segmented ferrous, non-ferrous, and heavy-metal streams
- **Aluminum Casting Scrap Processing:** recovers aluminum from mixed casting rejects and dross concentrate
- **Secondary Aluminum Smelter Feedstock:** delivers sized, cleaned aluminum flake to secondary smelters and remelt operations
- **Post-Industrial Aluminum Recycling:** reclaims aluminum from manufacturing byproduct and process scrap
- **Zorba and Twitch Upgrading:** upgrades zorba and twitch fractions into alloy-graded aluminum concentrate

FEATURES

Key Features

The line integrates shredding, classification, magnetic separation, air separation, multi-stage eddy current separation, and X-ray sorting under a single PLC control system.

Apron Feeder

The heavy-duty apron feeder receives loose or baled aluminum scrap from a wheel loader or tipping floor and meters it onto the inclined infeed conveyor. Its self-scraping chain-plate design handles bales, oversized cut-offs, and mixed loose input without bridging or manual intervention.

- **Function:** primary bunker discharge and metering feed

- **Design:** heavy-gauge steel chain plates with self-cleaning scraper
- **Feed handling:** not limited by particle size, density, or bale format

High-Angle Belt Conveyor

The high-angle belt conveyor lifts aluminum scrap from the feeder to the shredder inlet with corrugated sidewalls and cross cleats that hold material on steep inclines. Its compact footprint fits sites where floor-level space is limited.

- **Function:** steep-incline transfer to shredder inlet
- **Design:** corrugated sidewall belt with cross cleats
- **Advantage:** high throughput in a small footprint

Hammer Mill Shredder



The hammer mill shredder delivers primary size reduction of the aluminum scrap in a single pass. Hinged hammers on a high-speed rotor impact material against a breaker plate, producing a densified, cleaned flake suited to downstream sensor-based sorting. Hydraulic feed rollers meter input against the rotor at controlled speed.

- **Function:** single-pass primary size reduction with densification
- **Design:** hinged hammers on high-speed rotor, hydraulic feed rollers, breaker plate
- **Advantage:** high throughput, tolerant of hard inclusions, produces smelter-ready flake geometry

Hammer Mill Shredder Specifications:

Model	Main Motor / Pressure Roller / Hydraulic (kW)	Rotary Diameter (mm)	RPM	Shredder Width (mm)	Total Weight (t)
TT-HMS-315	315 / 11 + 11 / 15	Ø1300	600	1400	51
TT-HMS-450	450 / 15 + 15 / 15	Ø1300		1600	68
TT-HMS-630	630 / 18.5 + 18.5 / 18.5	Ø1500		1800	98
TT-HMS-900	900 / 18.5 + 18.5 / 18.5	Ø1500		2200	110

Vertical Hammer Mill (Alternative Primary Option)

The vertical hammer mill delivers primary size reduction in a vertical rotor configuration, suited to aluminum profile scrap and geometrically consistent input. Material falls into the chamber by gravity, meets the high-speed rotor, and exits through a bottom discharge. The vertical layout gives a compact footprint compared to horizontal hammer mills at similar capacity.

- **Function:** vertical-axis primary size reduction
- **Design:** high-speed vertical rotor with chamber-based impact reduction
- **Advantage:** compact footprint, ideal for aluminum profile and geometric scrap

Vertical Hammer Mill Specifications:

Model	Power (kW)	Rotary Diameter (mm)	RPM	Shredder Chamber Diameter (mm)	Shredder Chamber Height (mm)	Total Weight (t)
TT-VHM-250	110 to 160	Ø1100	520 / 630	1280	1660	18
TT-VHM-450	160 to 250	Ø1500		1600	1800	24

Twin-Shaft Shredder (Alternative Primary Option)



For baled or highly contaminated aluminum feed, a twin-shaft shredder replaces the hammer mill as primary. Two counter-rotating shafts with interchangeable cutter discs shear material at low rpm and high torque, handling packed bales and mixed contamination without stalling.

- **Function:** primary bale opening and low-rpm shear reduction
- **Advantage:** handles baled and mixed input without pre-treatment

Twin-Shaft Shredder Specifications:

Model	Power (kW)	Rotary Diameter (mm)	Center Distance (mm)	Shredder Width (mm)	RPM	Total Weight (t)
TT-TSS-1300	37 + 37	Ø520	400	1300	3 to 15	8
TT-TSS-1500	55 + 55	Ø630	520	1500		17
TT-TSS-1600	75 + 75	Ø510	400	1600		14
TT-TSS-1800	110 + 110	Ø740	610	1800		33
TT-TSS-2200	75 + 75	Ø650	520	2200		30

Single-Shaft Shredder (Secondary Reduction Option)



Paired with a twin-shaft shredder or used stand-alone for cleaner input, the single-shaft shredder delivers uniform target flake geometry against a stationary comb and bottom screen.

- **Function:** secondary or stand-alone size reduction to target flake size
- **Advantage:** uniform particle size for sensor-based sorting

Single-Shaft Shredder Specifications:

Model	Power (kW)	Rotary Diameter (mm)	Shredder Width (mm)	RPM	Total Weight (t)
TT-SSS-800	37	Ø400	800	80	4.04
TT-SSS-1200	55	Ø400	1200		5
TT-SSS-1500P	55 + 55	Ø460	1500		11
TT-SSS-2200P	90 + 90	Ø800	2200		19
TT-SSS-3000P	160 + 160	Ø800	3000		25

Magnetic Drum Separator (Top-Fed)



The top-fed magnetic drum separator recovers ferrous fragments (fasteners, steel inserts, bimetal pieces) from the shredded stream immediately after size reduction. A semi-enclosed vibratory-fed drum with adjustable field strength captures ferrous material efficiently while non-ferrous aluminum passes through to downstream sorting.

- **Magnetic field strength:** 1,800 to 8,000 Gauss (selectable)
- **Operation:** continuous, high recovery rate
- **Design:** simple structure, reliable operation, straightforward maintenance

Magnetic Drum Separator Specifications:

Model	Drum Length (mm)	Drum Diameter (mm)	Magnet Intensity (Gs)	Driving Power (kW)	Vibrating Motor Power (kW)
TT-MDS-32/50	500	Ø320	1,800 to 8,000	1.1	0.4
TT-MDS-32/60	600				
TT-MDS-32/80	800			1.5	0.8
TT-MDS-32/100	1000				
TT-MDS-32/120	1200				1.1
TT-MDS-32/140	1400				1.5

Trommel Screen



The rotary trommel screen classifies the shredded aluminum into size fractions for optimal downstream sorting. Wear-resistant screen panels and a shaft-less drive extend service life on abrasive aluminum shred.

- **Screen material:** wear-resistant alloy panels
- **Drum options:** hexagonal or cylindrical, custom aperture sizes
- **Drive:** polyurethane driving system, low noise, no-shaft design

Trommel Screen Specifications:

Model	Power (kW)	Drum Diameter (mm)	Drum Length (mm)	Capacity (m ³ /h)	Speed (r/min)	Inclination (%)
TT-TRS-1220	4.0	Ø1200	2000	12	5 to 25	0 to 6
TT-TRS-1240	5.5		4000	18		
TT-TRS-1260	5.5		6000	20		
TT-TRS-1290	7.5		9000	35		
TT-TRS-1560	7.5	Ø1500	6000	35		
TT-TRS-1590	11		9000	50		
TT-TRS-15120	18.5		12000	65		
TT-TRS-1860	11	Ø1800	6000	50		
TT-TRS-1890	18.5		9000	65		
TT-TRS-18120	22		12000	75		
TT-TRS-2060	18.5	Ø2000	6000	65		
TT-TRS-2090	22		9000	75		
TT-TRS-20120	30		12000	85		

Flip-Flow Screen



The flip-flow screen handles the damp, sticky, or fine fraction that blinds conventional screens. Flexible polyurethane screen panels are stretched and released ("flip-flow" action) by the vibrating drive, throwing material clear at high acceleration and preventing mesh blinding.

- **Application:** fines separation on wet, sticky, or oil-coated aluminum
- **Screen deck:** elastic polyurethane panels
- **Anti-blinding:** dynamic stretch-release action across the deck

Vertical Air Separator



The vertical air separator lifts light contaminants (film, dust, coating fragments, labels) from the sized aluminum stream into a cyclone dust collector. A vibratory feeder distributes material into a Z-hopper, a centrifugal fan draws light particles upward, and heavy aluminum drops by gravity into the discharge.

- **Function:** light-fraction removal and dust extraction
- **Design:** Z-hopper vibratory feed, centrifugal fan, cyclone dust collector

Vertical Air Separator Specifications:

Model	Air Blower	Feed Valve	Light Material Valve	Dust Valve	Capacity (t/h)
TT-VAS-43	20 to 30 HP	2 HP	2 HP	2 HP	4 to 5
TT-VAS-86	40 HP	3 HP	1.5 HP	3 HP	8 to 10

Eccentric Eddy Current Separator (Multi-Stage Configuration)

The eccentric eddy current separator recovers aluminum from the non-magnetic stream. An eccentric rotor design places the magnetic pole close to the belt surface, giving a wider throw angle for small aluminum flakes than a concentric rotor design. Aluminum scrap lines typically deploy the separator in a multi-stage configuration: a high-frequency (H) rotor variant handles the fine fraction while a standard rotor handles coarse material, and a second-pass eccentric ECS catches undersize aluminum missed by the primary. A vibrating feeder and adjustable baffle at each stage allow fine-tuning to the specific flake profile.

- **Rotor type:** eccentric high-speed magnetic rotor (standard and high-frequency variants)
- **Particle size range:** ≥1 mm²
- **Magnet material:** NdFeB with anti-fall spray-plastic protection
- **Recovery target:** aluminum, brass, copper, zinc, and other non-ferrous metals

Eccentric Eddy Current Separator Specifications:

Model	Feed Width (mm)	Feed Length (mm)	Particle Size	Capacity (m ³ /h)	Power (kW)	Weight (kg)	Length (mm)	Width (mm)	Height (mm)
TT-ECS-5	300	1500	≥1 mm ²	6	5.9	730	4600	1123	1200
TT-ECS-6	400			10		895		1223	
TT-ECS-8	600			20		1225		1623	
TT-ECS-10	800			25	6.3	1555		1823	
TT-ECS-12	1000			30	7.0	1875		2023	
TT-ECS-14	1200			35	8.8	2275		2223	
TT-ECS-16	1400			40	10	2850		2423	
TT-ECS-20	1800			50	10.7	3650	5000	2823	
TT-ECS-22	2000			55	13	4500		3023	

X-Ray Transmission Sorter



The X-Ray Transmission sorter provides a final quality upgrade of the aluminum concentrate by rejecting residual heavy-metal contamination (copper wire, lead-bearing fragments, dense alloy pieces, bimetal composites). Material passes on a conveyor belt between an X-ray emitter above and a set of LDA dual-energy receivers below, and a self-learning classifier reads the atomic-density signal and triggers a compressed-air jet valve at the belt head pulley to eject targeted particles.

- **Detection method:** dual-energy X-ray transmission with LDA receivers
- **Classifier:** self-learning system that accumulates material characteristic samples
- **Typical application:** heavy-metal removal from aluminum concentrate, cast-vs-wrought separation, alloy quality upgrade
- **Ejection:** compressed-air jet valve array

X-Ray Transmission Sorter Specifications:

Model	Belt Width (mm)	Raw Material Size (mm)	Capacity (t/h)	Power (kW)	Weight (t)	Machine Size L×W×H (mm)
TT-XRT-1200	1200	10 to 100	4 to 6	6.6	3	6000 × 1490 × 1780
TT-XRT-1800	1800		6 to 8		4	6000 × 2090 × 1780
TT-XRT-2400	2400		8 to 10		5	6000 × 2690 × 1780

Buffer Silo (Optional)

An optional buffer silo between shredding and downstream sorting decouples the shredder throughput from the sorting stage. This allows batch-mode sorting, material blending across shredder cycles, and steady-state operation of the sensor sorters when shredder output is intermittent.

- **Function:** intermediate storage and flow regulation between shredding and sorting
- **Advantage:** enables batch sorting, material blending, and decoupled operation
- **Configuration:** multi-cell silo with metered discharge to downstream conveyor

Chain Apron Conveyor and Belt Conveyors

Heavy-duty chain apron conveyors handle the high-abrasion transfers (post-shredder discharge, ferrous byproduct), while belt conveyors carry lighter-duty inter-stage material between sensor sorting modules. All conveyors are integrated into the central PLC control system for coordinated line operation.

- **Chain apron function:** high-abrasion transfer
- **Belt conveyor function:** light-duty inter-stage transfer
- **Integration:** full PLC coordination and safety interlocks

Electrical Control System

The line runs under a single PLC control system with automatic overload reverse control, interlock logic, and an operator HMI. All motors, sensors, and pneumatic actuators are wired to the central cabinet for coordinated operation and remote diagnostics.

- **Controller:** PLC-based programmable control
- **Protection:** automatic overload reverse, safety interlocks across the full line
- **Interface:** HMI touchscreen with process-status visualization

THEORY & METHOD

Theory and Method

Aluminum scrap arrives in a range of formats: loose extrusion cut-offs, baled mixed aluminum, profile lengths, sheet trim, and castings, often mixed with ferrous fasteners, non-metal attachments (rubber gaskets, plastic seals, paint), and heavy-metal contamination (copper wire, lead, brass fittings). Producing a clean aluminum flake requires reducing the input to a

uniform particle size and then applying separations that exploit different physical properties in sequence.

Size reduction comes first. A hammer mill drives hinged hammers on a high-speed rotor against a breaker plate, delivering primary reduction plus surface densification in a single pass. For baled or highly contaminated input, a twin-shaft shredder replaces the hammer mill upstream, opening bales at low rpm and high torque, followed by a single-shaft shredder that trims the intermediate output to the target flake size. Both routes converge into the same downstream separation train.

The sized material then passes through classification and separation stages. A top-fed magnetic drum removes ferrous fragments (fasteners, steel inserts, bimetal composite pieces) immediately after shredding to protect downstream equipment. A rotary trommel classifies the material into size fractions for optimal sorting. A flip-flow screen handles any damp or sticky fine fraction that would blind conventional mesh. A vertical air separator lifts light contaminants (film, dust, coating fragments) into a cyclone dust collector. The eddy current separator train recovers aluminum: a high-frequency rotor variant handles the fine fraction (small chips, dust-borne aluminum) while a standard rotor handles coarse material, and a second-pass eddy current stage catches undersize aluminum missed by the primary. Finally, an X-ray transmission sorter distinguishes remaining metal by atomic density, cleaning heavy metal contamination (copper wire, lead-bearing pieces, dense alloy fragments) out of the aluminum concentrate. Optional buffer silo storage between shredding and downstream sorting allows batch-mode operation and material blending.

TECHNICAL SPECIFICATIONS

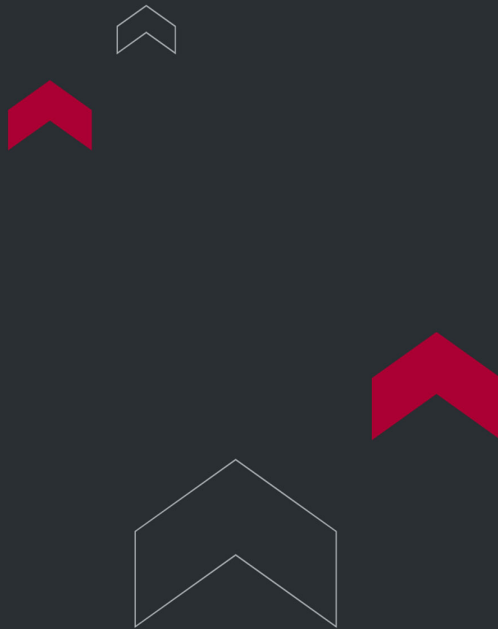
Technical Specifications

The Aluminum Scrap Recycling Line is engineered around the customer's aluminum scrap profile, throughput target, and output purity requirement. Primary shredding configuration is selected to match input format and required capacity.

Parameter	Specification
Line Focus	Aluminum scrap shredding, sorting, and clean flake recovery

Parameter	Specification
Typical Throughput Range	3 to 30+ t/h (customer-specific)
Input Material	Aluminum extrusion, profile, sheet, casting, mixed aluminum scrap, zorba, twitch
Aluminum Recovery Yield	95 to 98% under normal input conditions
Primary Shredding Options	Hammer mill (standard), vertical hammer mill, twin-shaft + single-shaft
Ferrous Recovery Stage	Top-fed magnetic drum separator
Non-Ferrous Recovery Stages	Multi-stage eccentric eddy current separators (standard rotor + high-frequency variant + rework stage)
Sensor-Based Sorting	X-ray transmission (dual-energy) for final quality upgrade
Size Classification	Rotary trommel screen + flip-flow screen
Light-Fraction Removal	Vertical air separator with cyclone dust collector
Buffer Storage (Optional)	Multi-cell silo for batch-mode sorting
Control System	PLC with HMI touchscreen, full-line interlocks
Installation Options	Skid-mounted modules or civil-work integrated
Power Supply	380 V / 50 Hz (customer voltage available on request)

Each line is engineered to the customer's specific aluminum scrap profile and output requirements. Contact the Torontech application engineering team for a site-specific process flow diagram and quotation.



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