WENDT Aluminum Sorting Technology Discussion

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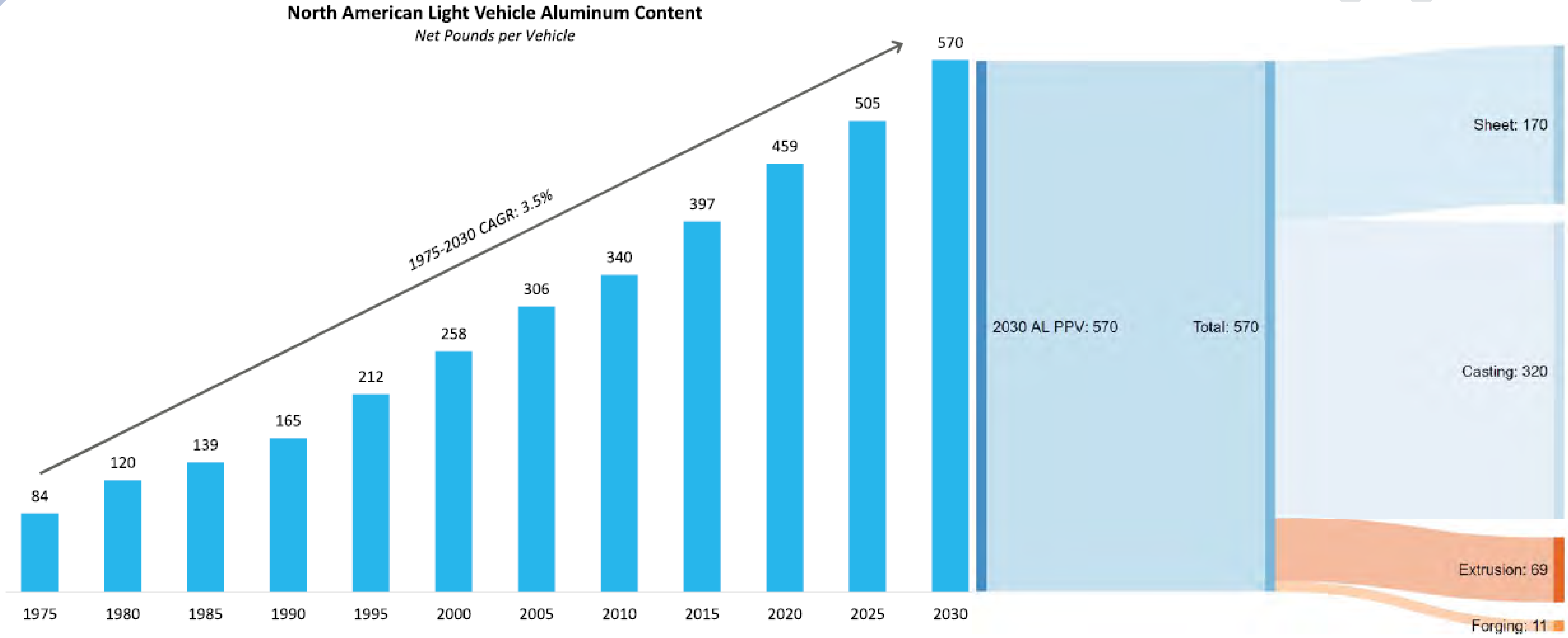
INDUSTRY DRIVERS

Low Carbon, Sustainability Goals + Government Regulation + Increasing Consumer Demand = Increasing Demand For Quality Aluminum Scrap

Credit to:

- Economic Policy Institute – May 2021 https://www.epi.org/publication/aluminum-producing-and-consuming-industries-have-thrived-under-u-s-section-232-import-measures
- Congressional Research Service: https://crsreports.congress.gov/product/pdf/R/R47294

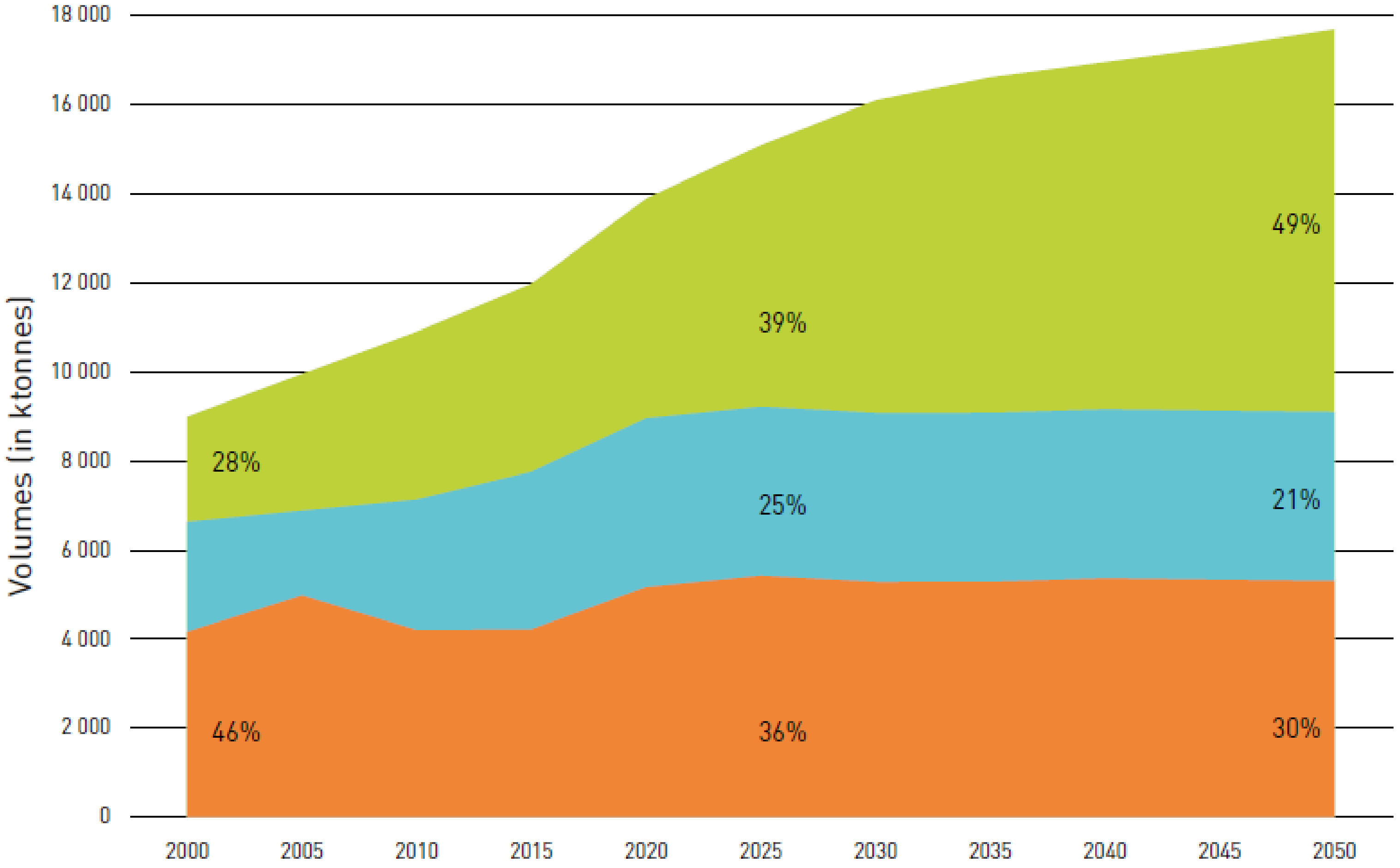
ALUMINUM USAGE IN AUTOMOTIVE PRODUCTION



ADVANCED TECHNOLOGY.
PROVEN PERFORMANCE.

SOURCE: DUCKER FRONTIER APRIL 2020 REPORT

INCREASING DEMAND FOR ALUMINUM INGOT



EU demand for aluminum ingots from 2000 to 2050 showing a growth scenario for aluminum on recycled basis

Source: European Aluminum Vision 2050 report ‚European Aluminium‘s contribution to the EU's mid-century low-carbon roadmap'; based on CRU datasets (2018)

TYPICAL SHREDDER FEEDSTOCKS

OLD SHEET / SIDING (TAINT TABOR / TALE)

EXTRUSIONS (TUTU)

MIXED LOW COPPER (TABOO)

UBC's

IRONY CAST

PRODUCTION SCRAP

ALUMINUM WHEELS (TROMA)

MAXIMIZING ALUMINUM SCRAP VALUE

FACTORS THAT PLAY A ROLE IN SCRAP VALUE

Contaminants: Surface contamination, organics, waste, and other metals must be removed prior to melting

Attachments: Iron, Rubber, Thermobreak and other dual nature pieces must be removed prior to melting

Coatings: Paint, Powder Coating, Chrome and other surface coatings must be removed prior to melting

Size: The larger the scrap pieces, the better the melt yield. Small scrap values can be raised by baling and briquetting to increase melt yield.

Alloy Purity: Shredding batches of known feedstock will raise alloy purity and raise scrap values.
Sorting mixed metals into concentrated alloys via XRT and LIBS will raise scrap values.
Higher alloy purity will reduce furnace times and potentially double furnace capacities.

EZR 88el

EZR 88eII

ALUMINUM PRE-SHREDDING

BALE BREAKING

Complete Range From 5 – 150 Ton/Hrs

EZR 99e


WENDT 5050


WENDT 6060

ALUMINUM SHREDDING

SHREDDERS BORN FROM STEEL –

OPTIMIZED FOR ALUMINUM

Complete Range From 5 - 30 Ton/Hr +


WENDT 6090

ALUMINUM SHREDDING

THE PROCESS

Pre-Shred

Shred

Concentrate

Sort

EVOLUTION OF SENSOR BASED SORTING

> 150 Machines Sorting Metals Worldwide

2004: **TOMRA XRT 1.0 Introduction (PACT Software)**
Pass # 1: Input ZORBA, **Eject 25% Heavy Metals with High Alloy Aluminum**, Drop Twitch with Magnesium
Pass # 2: **RERUN** Heavy Metals with High Alloy Aluminum, Eject Heavy Metals, Drop High Alloy Aluminum
Particle size > 10mm

2018: **TOMRA X4 XRT (Improved: Sensor, X-ray generator, CUI software with improved signal processing)**
Pass # 1: Input ZORBA, **Eject 10% Heavy Metals**, Drop Twitch with Magnesium **(NO RERUN)**
Particle size > 10mm

2020: **TOMRA X6 XRT (High Resolution Sensor Introduced)**
Particle size > 5mm
Magnesium reduction now possible

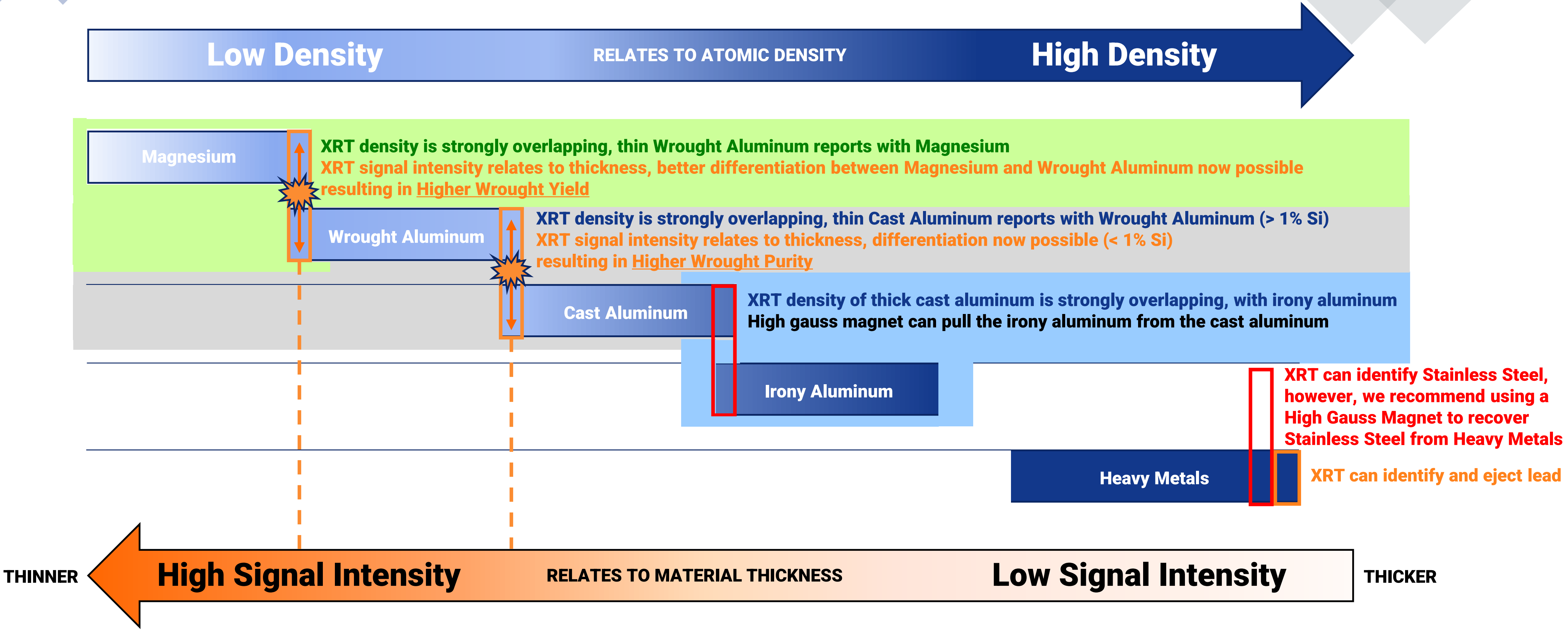
2023: **TOMRA XRT 2.0 (New software, new machine design, additional sorting capabilities)**
Available Sensors: High Sensitivity and High Resolution
Multiple Valves: High Resolution TS450 and High Power TS1500

SOLD 2020

INSTALLED 2021

TOMRA XRT 2.0 MATERIAL CLASSIFICATION

- Better technology with Higher Wrought Purity
- Better technology with Higher Wrought Yield



TOMRA's proprietary technology, software, and 1:1 imaging produces higher signal quality that allows further analysis and differentiation allowing overlapping densities to be differentiated by material thickness

DIDION METAL POLISHING DRUMS

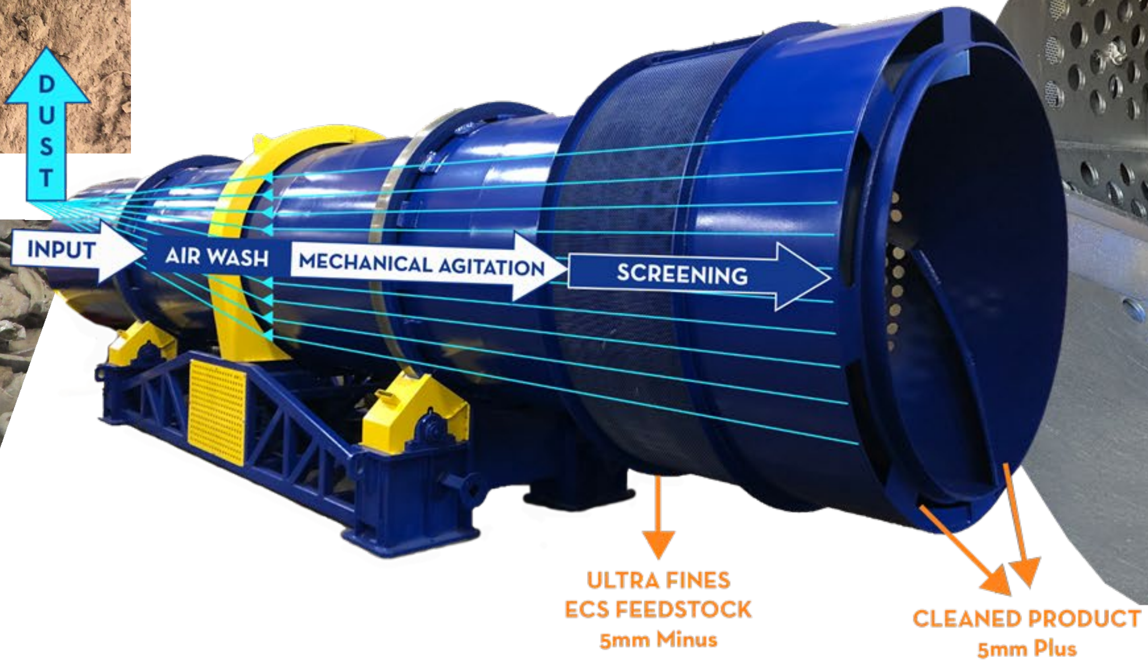
MECHANICAL AGITATION & SCREENING WITH INTEGRATED ASPIRATION & DUST COLLECTION

Dust Collector Output

Introduced in 2021

**> 15 Machines
Polishing Metals
Worldwide**

Before Polishing



After Polishing

- Remove Dust, Dirt, Debris, Oxidation from Metal
- Enriched Metal Concentrate has a Higher Melt Yield

DIDION METAL POLISHING DRUMS

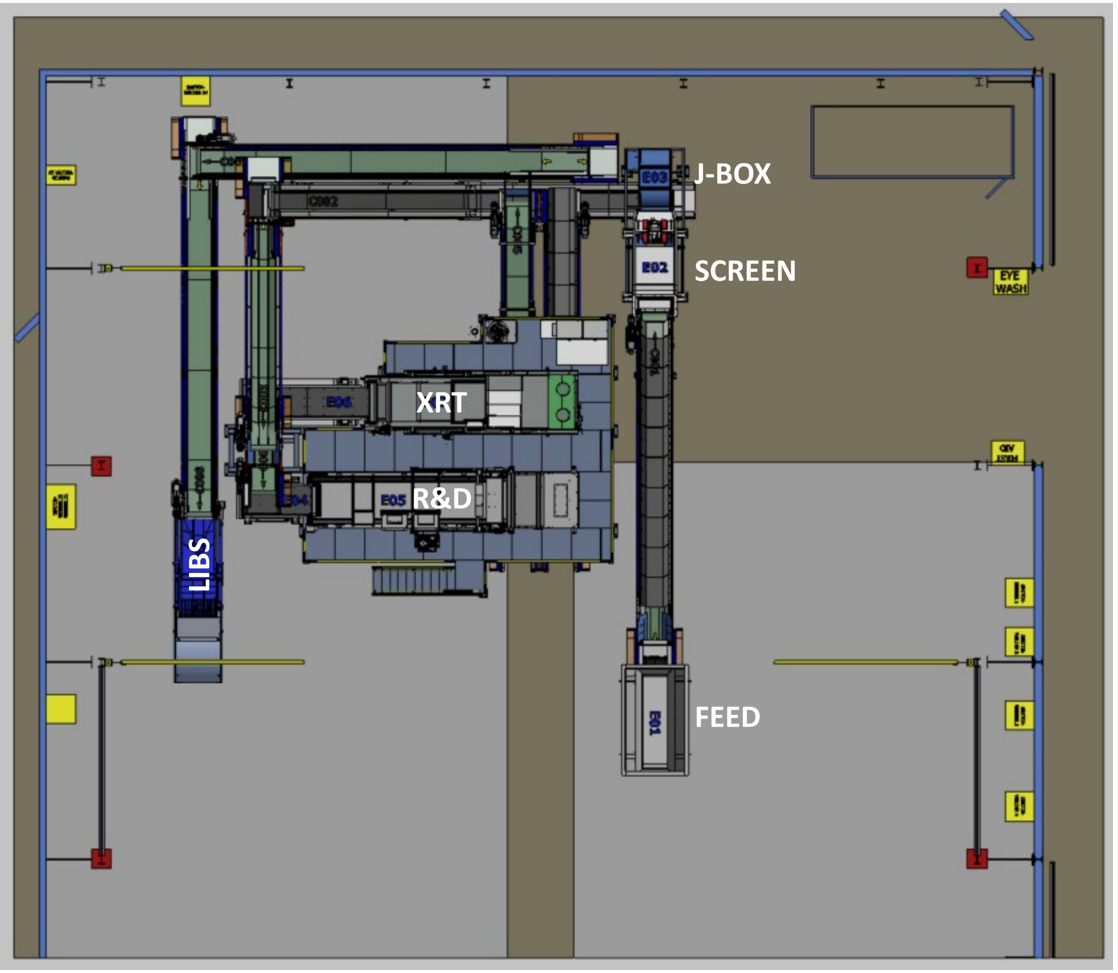
MECHANICAL AGITATION & SCREENING WITH INTEGRATED ASPIRATION & DUST COLLECTION

TOMRA XRT MACHINE
- CONCENTRATE ALUMINUM
- REMOVE HEAVY METALS AND MAGNESIUM

FINISHED PRODUCT AFTER PROCESSING

WENDT TEST FACILITY

APPLICATION DEVELOPMENT



WENDT TEST FACILITY
APPLICATION DEVELOPMENT

TWITCH - UPCYCLED
Premium Low-Density Alloy (Low Si)
Premium Extrusion (6063)
Premium Cast (Low Mg)

EXTRUSIONS
Premium Extrusion (6063)

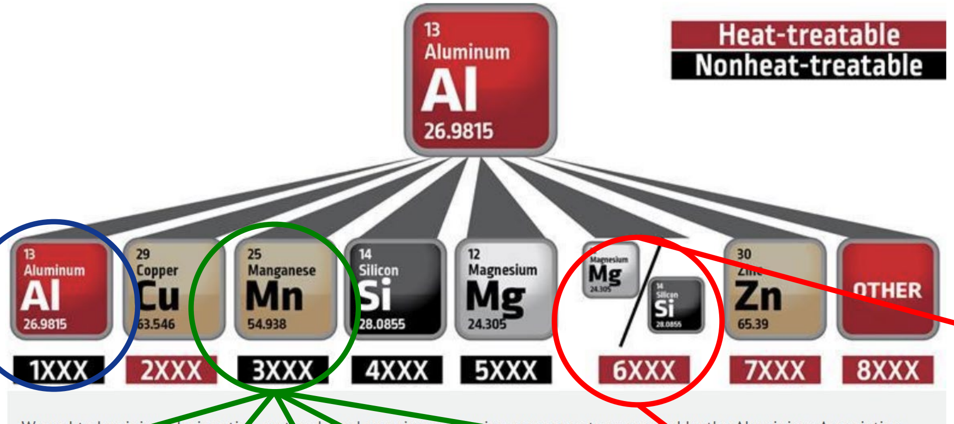
TAINT TABOR
High Quality 6xxx
High Quality 5xxx
High Quality 1xxx + 3xxx

PRODUCTION SCRAP
High Quality 6xxx
High Quality 5xxx

ALUMINUM SORTING

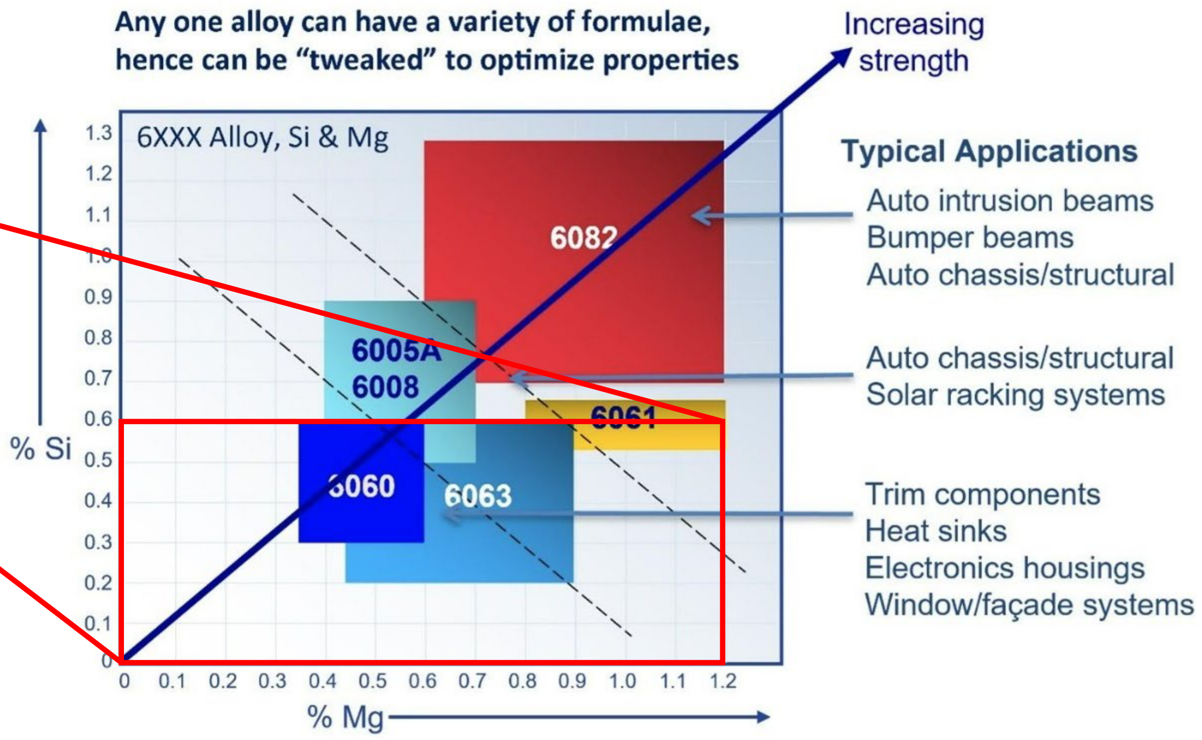
PREMIUM LOW-DENSITY ALUMINUM (Si<0.6, Mg<1.2, Mn UNCONSTRAINED)

Al > 99



Wrought aluminium designation system based on primary alloying components as created by the Aluminium Association

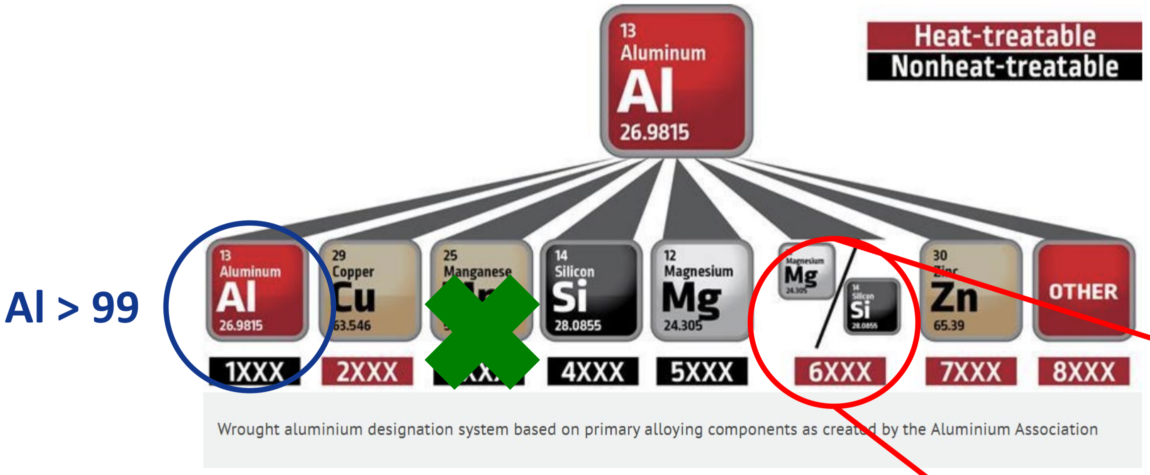
Alloy	Catalog Number	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn
3003	SS-3003	0.20x	0.50x	0.15x	1.2x	0.030x	<0.0050	<0.0050	0.080x
	WA-3003	0.40x	0.65x	0.090x	0.95x	0.010x	0.030x	0.030x	0.050x
	WB-3003	0.15x	0.30x	0.20x	1.5x	0.050x	<0.0050	<0.0050	0.020x
	ST1-3003	0.30x	0.33x	0.15x	1.2x	<0.0010	<0.0005	<0.0005	<0.0010
	ST2-3003	0.30x	0.65x	0.15x	1.2x	0.010x	0.015x	0.020x	0.020x
	ST2-3000	0.20x	0.50x	0.15x	1.2x	0.030x	0.010x	0.010x	0.050x
3004	SS-3004	0.18x	0.50x	0.15x	1.2x	1.1x	<0.0050	<0.0050	0.050x
	WA-3004	0.22x	0.60x	0.10x	1.0x	1.3x	0.010x	0.010x	0.15x
	WB-3004	0.10x	0.40x	0.20x	1.4x	0.90x	0.020x	0.020x	0.10x
	ST1-3000	0.20x	0.50x	0.15x	1.2x	1.0x	0.010x	0.010x	0.050x

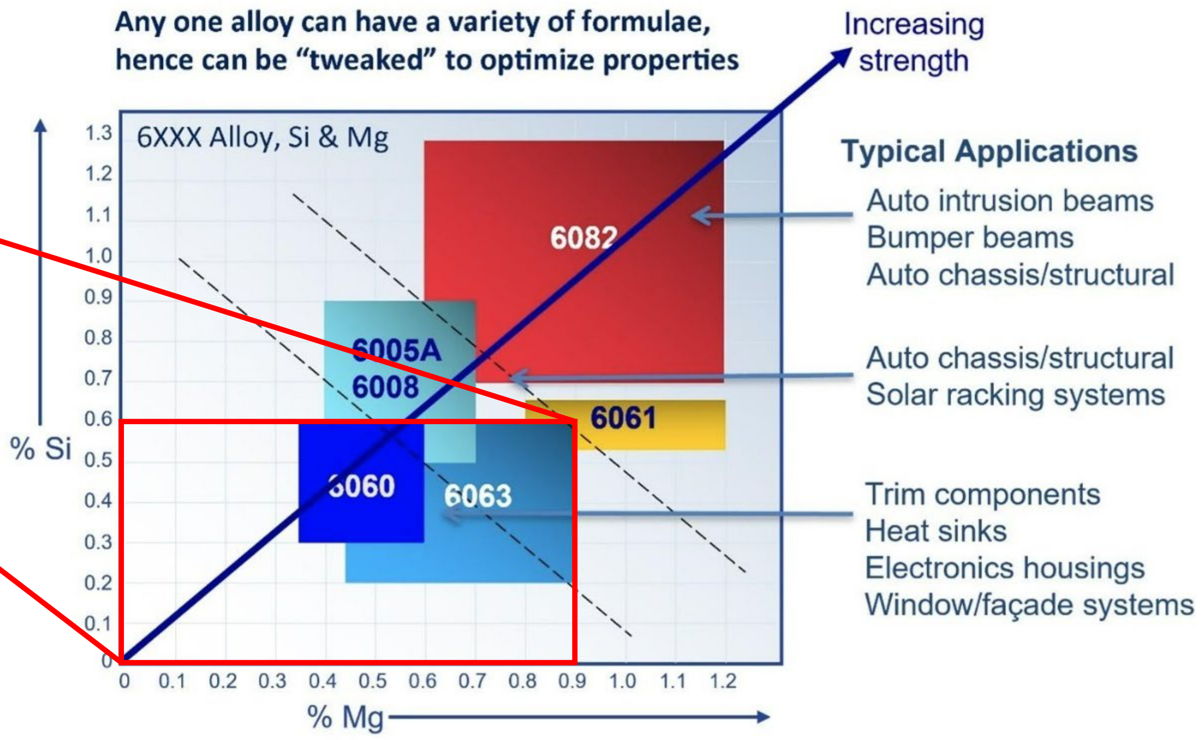


ALUMINUM SORTING

PREMIUM EXTRUSION

(Si<0.6, Mg<0.9, Mn<0.2)





EVALUATION OF LIBS TECHNOLOGY

DIFFERENT STRATEGIES TO SOLVE THE SAME PROBLEM

LIBS TECHNOLOGY GOALS:

- Removal of Tramp Materials
- Separation into Specific Aluminum Alloys
- Quality Control of Wrought Al (Low Silicon)
- Quality Control of Cast Al (Low Magnesium)
- Reduction of Furnace Cycle Times

AUSTIN AI	BINDER	STEINERT	TOMRA
STATIC LIBS – FIXED FOCAL LENGTH			DYNAMIC LIBS
SINGLE FILE CHUTE PRESENTATION		SINGLE FILE BELT PRESENTATION	WIDELY SPREAD BELT PRESENTATION
40MM AND LARGER			10MM AND LARGER
OUTPUT 1: DROP REMAINDER OUTPUT 2: EJECT HIGH PURITY	OUTPUT 1: DROP REMAINDER OUTPUT 2: EJECT 1 (CONCENTRATE) OUTPUT 3: EJECT HIGH PURITY	OUTPUT 1: DROP REMAINDER OUTPUT 2: EJECT 1 (CONCENTRATE) OUTPUT 3: EJECT HIGH PURITY	OUTPUT 1: DROP REMAINDER OUTPUT 2: EJECT HIGH PURITY

EVALUATION OF LIBS TECHNOLOGY

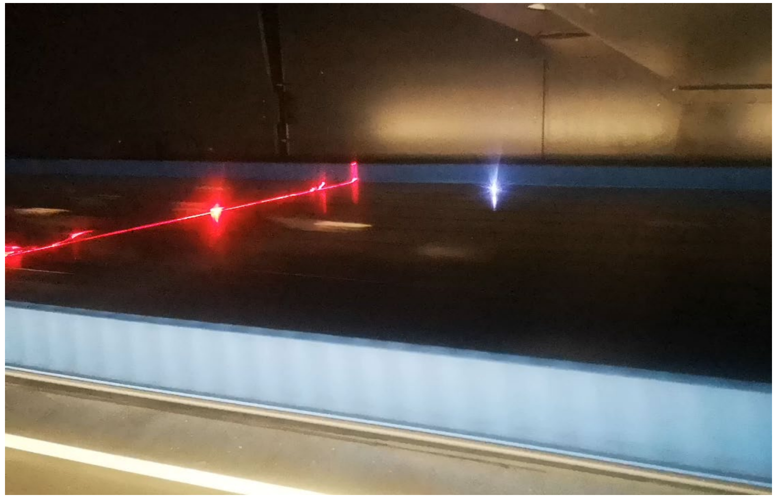
DIFFERENT STRATEGIES TO SOLVE THE SAME PROBLEM

AUSTIN AI
Automation & Instrumentation
Sensor Sorting for Metal Recycling
www.austinai.com

AustinAI EUROPE
Automation & Instrumentation
SENSOR SORTING FOR RECYCLING

EVALUATION OF LIBS TECHNOLOGY

DIFFERENT STRATEGIES TO SOLVE THE SAME PROBLEM



FURNACE PREPARATION

PAINTED ALUMINUM WAS FLAGGED AS A CONCERN (NORMALLY PRE-TREATED BY A DECOATING DRUM)

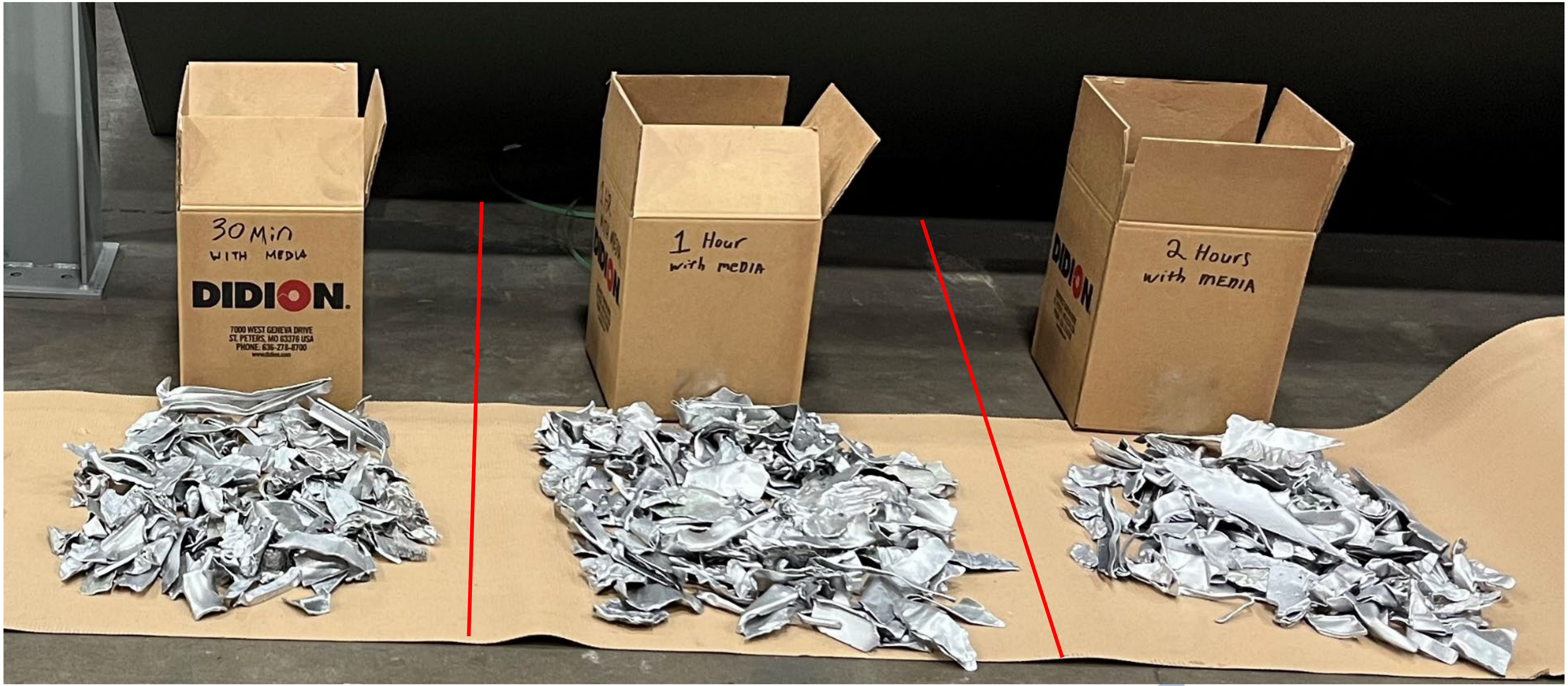
DIDION DECOATING DRUM

MODIFY EXISTING DRUM TECHNOLOGY FOR SCRAP

SCRAP ALUMINUM WILL HAVE AGGRESSIVE CLEANING FROM Fe CUBE MEDIA BELOW

DIDION DECOATING DRUM

WROUGHT ALUMINUM DERIVED FROM ZORBA



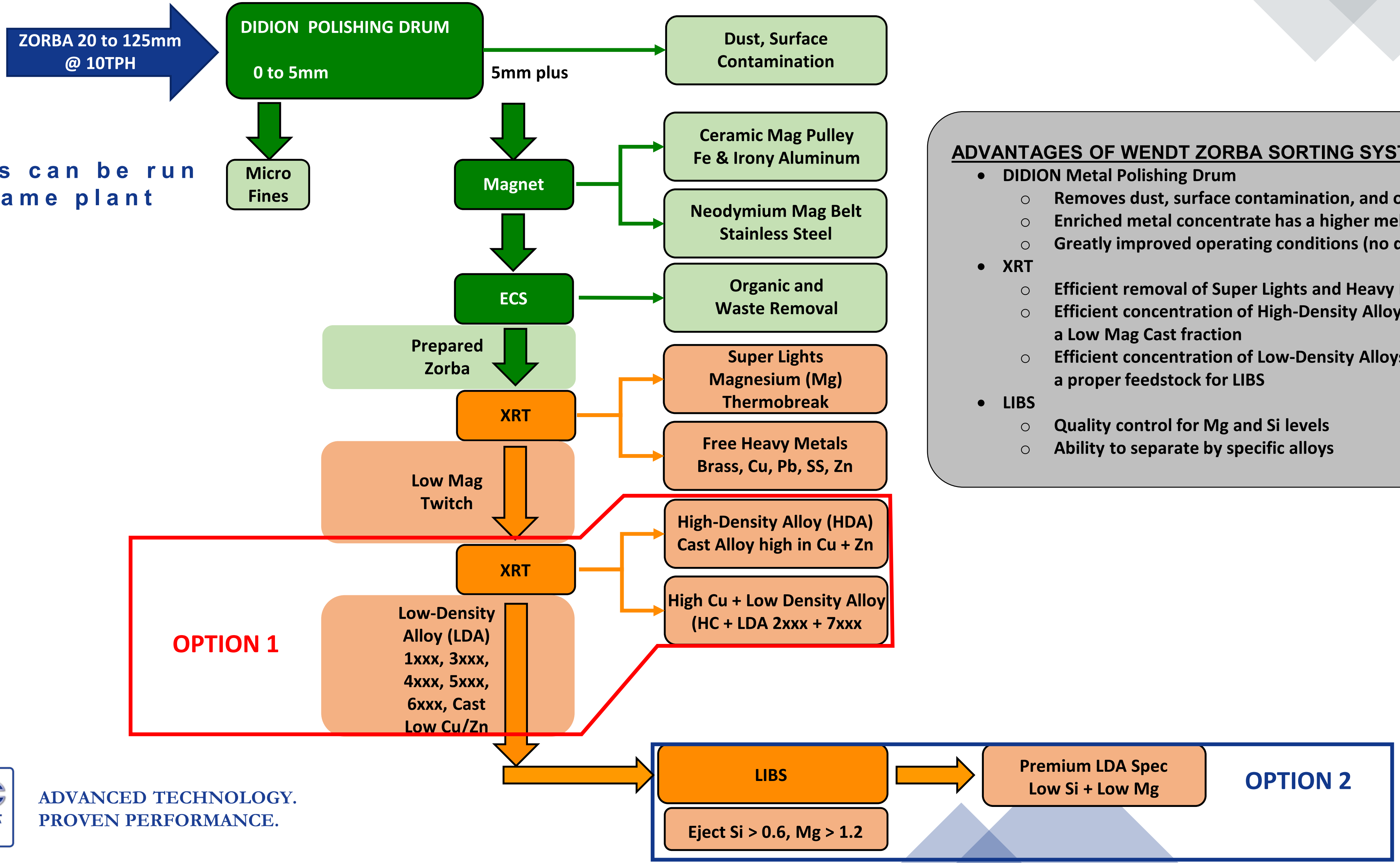
DIDION DECOATING DRUM

ALUMINUM WHEELS

WENDT ZOBRA SORTING

APPLICATION DEVELOPMENT

Zorba Fines can be run on the same plant



ADVANTAGES OF WENDT ZORBA SORTING SYSTEM:

- DIDION Metal Polishing Drum
  - Removes dust, surface contamination, and oxidation
  - Enriched metal concentrate has a higher melt yield
  - Greatly improved operating conditions (no dust)
- XRT
  - Efficient removal of Super Lights and Heavy Metals
  - Efficient concentration of High-Density Alloys (HDA) creating a Low Mag Cast fraction
  - Efficient concentration of Low-Density Alloys (LDA) creating a proper feedstock for LIBS
- LIBS
  - Quality control for Mg and Si levels
  - Ability to separate by specific alloys

WENDT ZOBRA SORTING

APPLICATION DEVELOPMENT

ZORBA 20 to 125mm @ 20TPH

DIDION POLISHING DRUM
0 to 20mm | 20 to 45mm | 45mm plus

Dust, Surface Contamination

Zorba Fines

Magnet | Magnet

Ceramic Mag Pulley Fe & Irony Aluminum

Neodymium Mag Belt Stainless Steel

ECS | ECS

Organic and Waste Removal

Prepared Zorba

XRT | XRT

Super Lights Magnesium (Mg) Thermobreak

Free Heavy Metals Brass, Cu, Pb, SS, Zn

Prepared Twitch

OPTION 1

XRT | XRT

High-Density Alloy (HDA) Cast Alloy high in Cu + Zn

High Cu + Low Density Alloy (HC + LDA 2xxx + 7xxx

Low-Density Alloy (LDA) 1xxx, 3xxx, 4xxx, 5xxx, 6xxx, Cast Low Cu/Zn

DIDION DECOATING DRUM

OPTION 3

LIBS

Eject Si > 0.6, Mg > 1.2

Premium LDA Spec Low Si + Low Mg

OPTION 2

Zorba Fines can be run on the same plant by changing the first screen in the DIDION Polishing Drum to 5mm

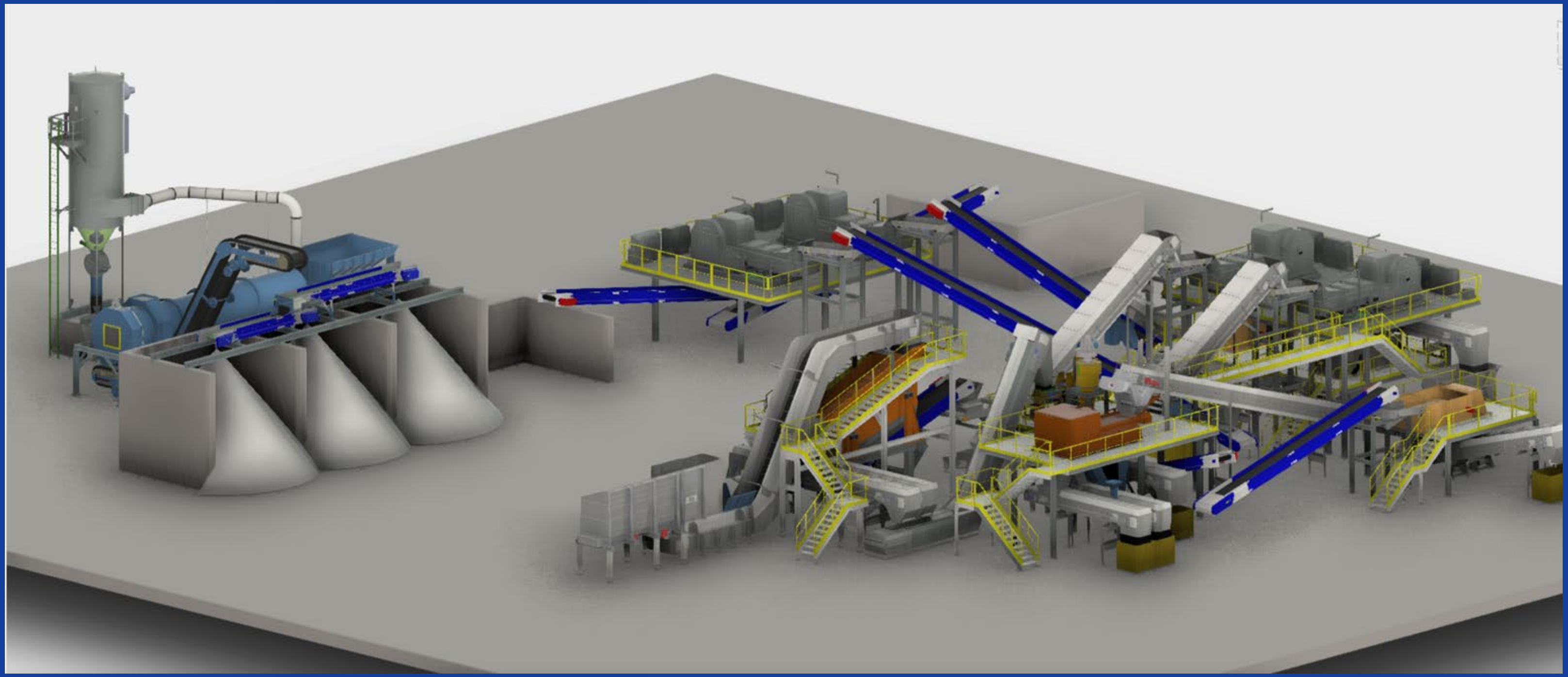
ADVANTAGES OF WENDT ZORBA SORTING SYSTEM:

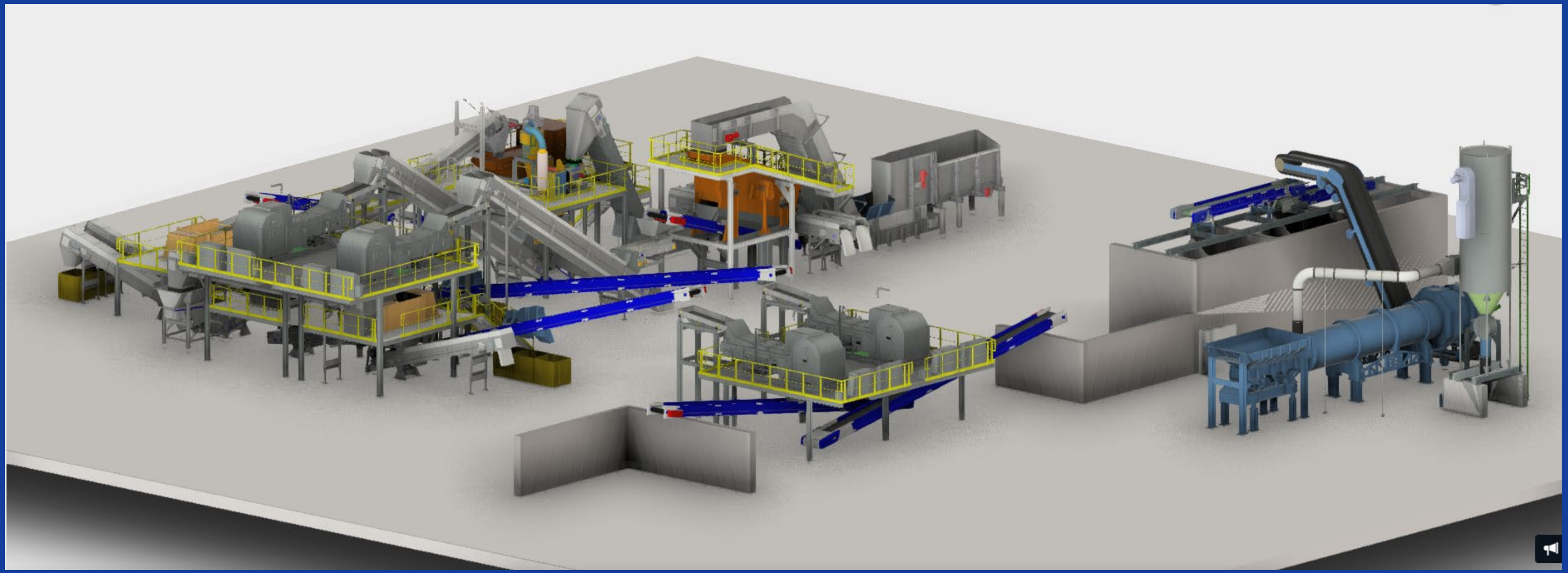
- DIDION Metal Polishing Drum
  - Removes dust, surface contamination, and oxidation
  - Enriched metal concentrate has a higher melt yield
  - Greatly improved operating conditions (no dust)
- XRT
  - Efficient removal of Super Lights and Heavy Metals
  - Efficient concentration of High-Density Alloys (HDA) creating a Low Mag Cast fraction
  - Efficient concentration of Low-Density Alloys (LDA) creating a proper feedstock for LIBS
- DIDION Decoating Drum
  - Mechanical agitation without heat
  - Low capital and low operating cost alternative
  - Eliminates need for VOC pollution control
- LIBS
  - Quality control for Mg and Si levels
  - Ability to separate by specific alloys

WENDT

ADVANCED TECHNOLOGY.
PROVEN PERFORMANCE.

EXAMPLE OF 20TPH ZORBA SORTING





STAY IN TOUCH WITH US

WE'RE JUST A PHONE CALL OR CLICK AWAY

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