XRF sorting machines

to upgrade NF-metal mix into high value products

Thomas Diesenreiter, REDWAVE

AGENDA

- NF-metal recycling process overview
- what is XRF
- comparison with other sorting technologies
- XRF sorting machines application example ZORBA Sorting
- REDWAVE XRF Next Generation

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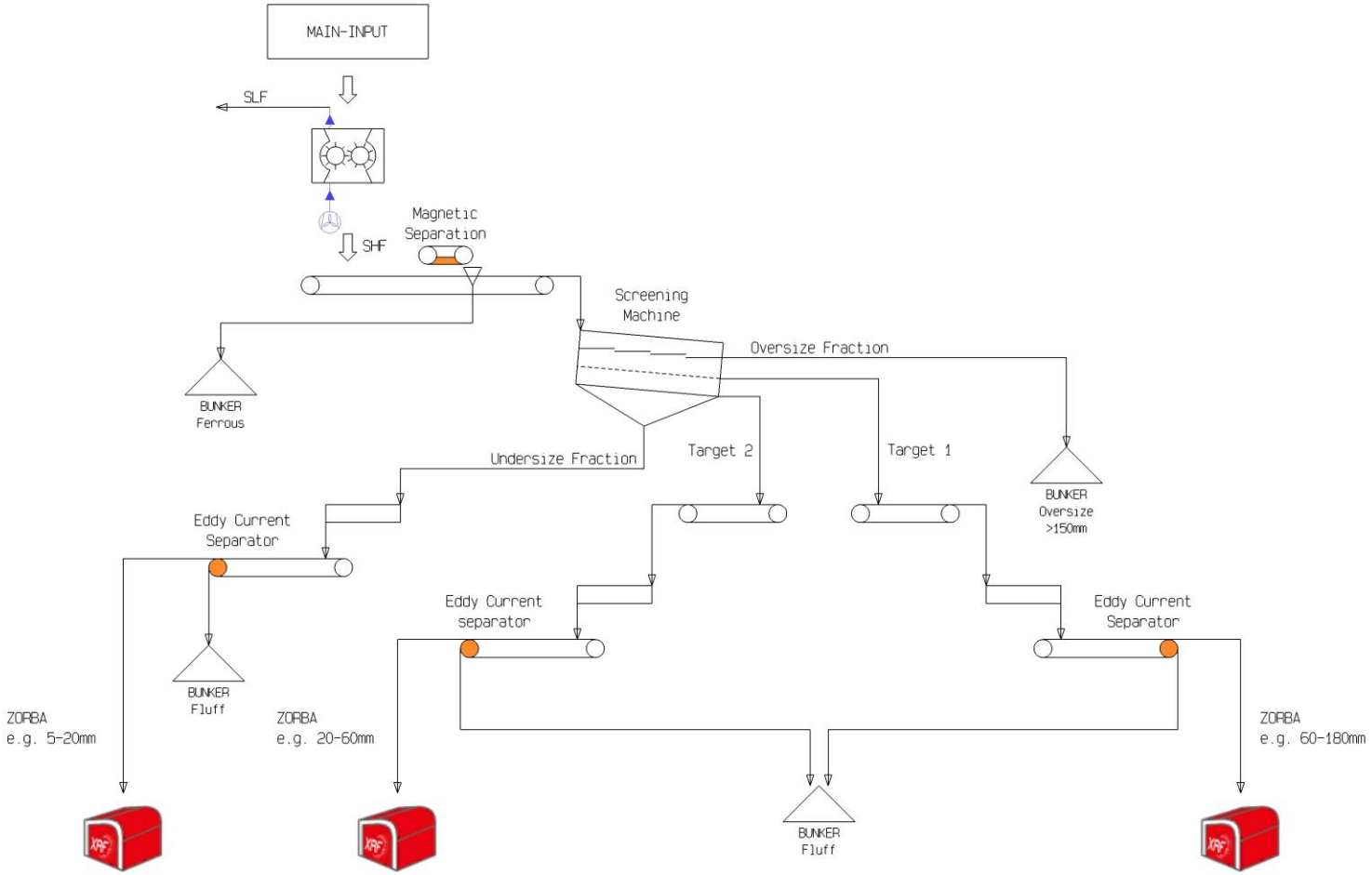
• NF-METAL RECYCLING PROCESS EXAMPLE



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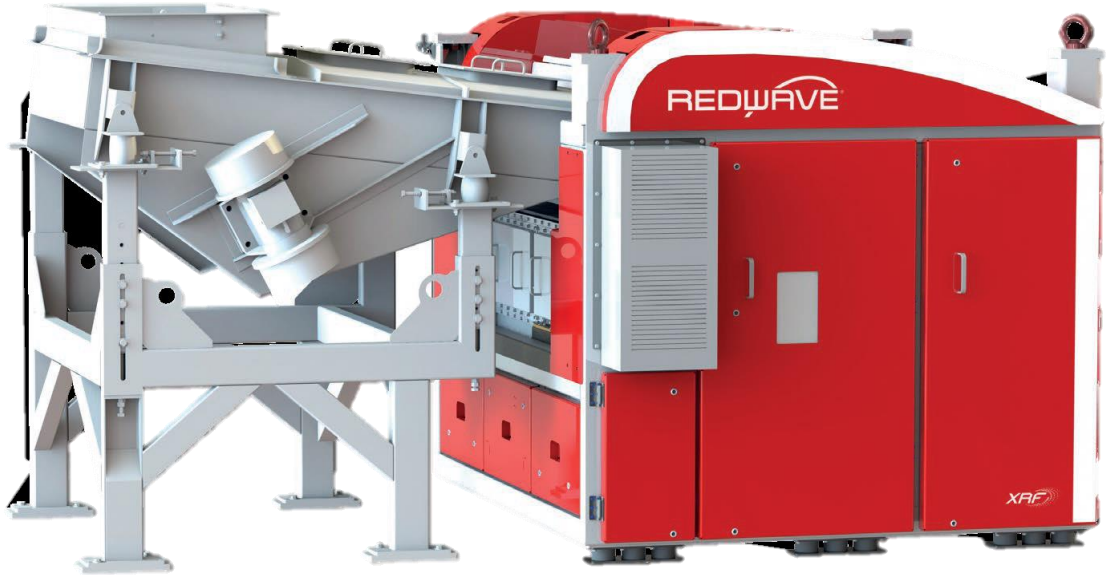
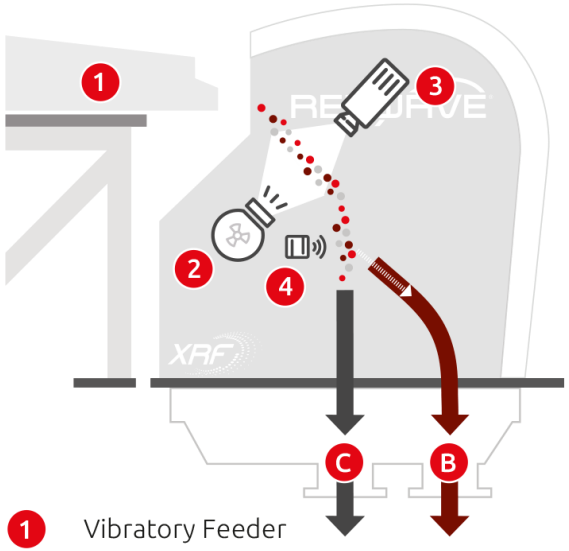
WHAT IS XRF AND HOW DOES IT WORK

- Non-destructive method **analysing the surface**
- Provides exact **elemental composition** of processed material
- Colour and surface-contamination independent*
- **XRF ≠ XRT**
  - XR**F** provides complete analysis and exact material composition
  - XR**T** can only distinguish material of different densities (e.g. aluminium vs. heavy metals)

** Applicable to REDWAVE XRF-SDD/C sorting machines only; needs to be determined on a case-to-case basis*

WHAT IS XRF AND HOW IS IT IMPLEMENTED IN A SORTING MACHINE





1. Vibratory Feeder
2. Sensor with x-ray tube and detector
3. Camera unit
4. Valves and nozzles
B. Eject
C. Pass

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• COMPARISON WITH OTHER SORTING TECHNOLOGIES

Nonferrous Sorting Task	REDWAVE XRF/C	XRT	Dense Media	Induction Sensor	Belt Type XRF	Color Sorter
Zorba into Twitch and Heavies	**Excellent**	**Excellent**	**Excellent**	***No***	Good	***No***
Twitch into sorted chemistries	Good	Good	***No***	***No***	Good	***No***
Heavies into						
▸ Mixed Red Metals	**Excellent**	***No***	***No***	***No***	Good	Average
▸ Mixed White Metals	**Excellent**	***No***	***No***	***No***	Good	Average
▸ Clean Zinc	**Excellent**	***No***	***No***	***No***	Good	***No***
▸ Clean Copper	**Excellent**	***No***	***No***	***No***	Good	Average
▸ Clean Brass	**Excellent**	***No***	***No***	***No***	Good	Average
▸ Clean Stainless Steel	**Excellent**	***No***	***No***	***No***	Good	***No***
Zurik into Clean Stainless Steel	**Excellent**	***No***	***No***	Good	Good	***No***
Stainless Steel in e.g. 316 and 304	**Excellent**	***No***	***No***	***No***	Good	***No***

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• XRF SORTING MACHINES APPLICATION EXAMPLES

- Sort into Heavy Metals: (Zebra) and Aluminium (Twitch)
- Removal of PCB´s (printed circuit boards)

- Sort into Individual Metals: (Copper, Zinc, Brass, Bronze, Stainless Steel, PCB's, and more)

- Sort into various Aluminium Grades
- Removal of PCB´s (printed circuit boards)

- Sort into Clean Stainless Steel and Waste
- Sort Stainless Steel into Alloys

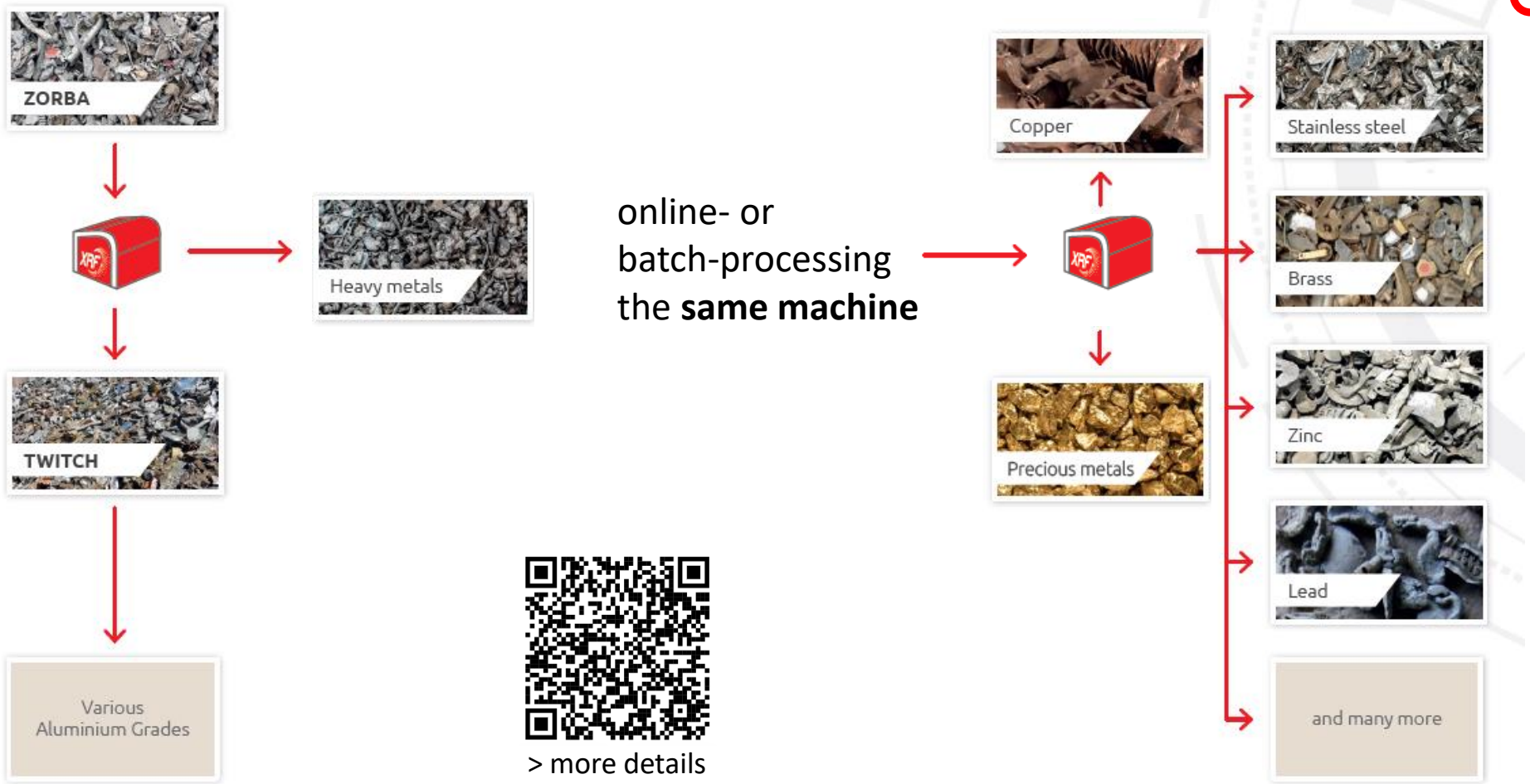
- Recovery of Precious Metals: Gold, Silver, etc.
- Sort into Individual Metals: (Zinc, Copper, Brass, etc)

- Sort into Furnace Ready Copper
- Removal of Tin, Silver, Nickel and other impurities

(brominated plastic)

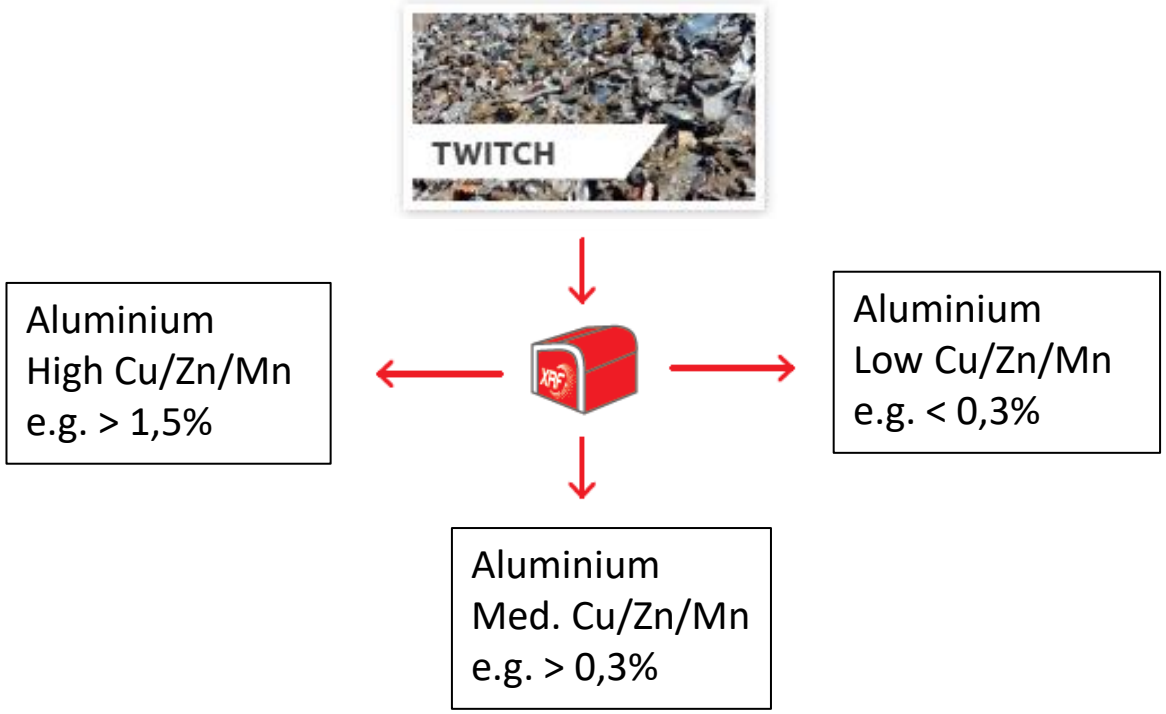
- Removal of Bromine and Antimony

• XRF SORTING MACHINES APPLICATION EXAMPLES



> more details

• XRF SORTING MACHINES APPLICATION EXAMPLES



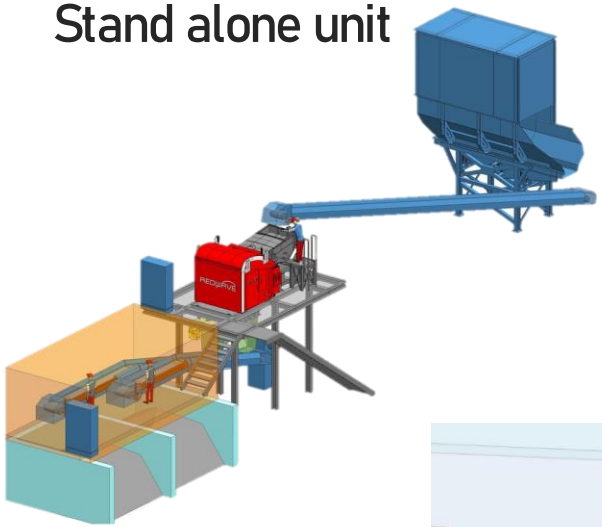
•"REDWAVE 3-step-sorting": sorting of TWITCH by content of copper, zinc and manganese in the aluminum stream

•Removal of PCB´s (printed circuit boards)

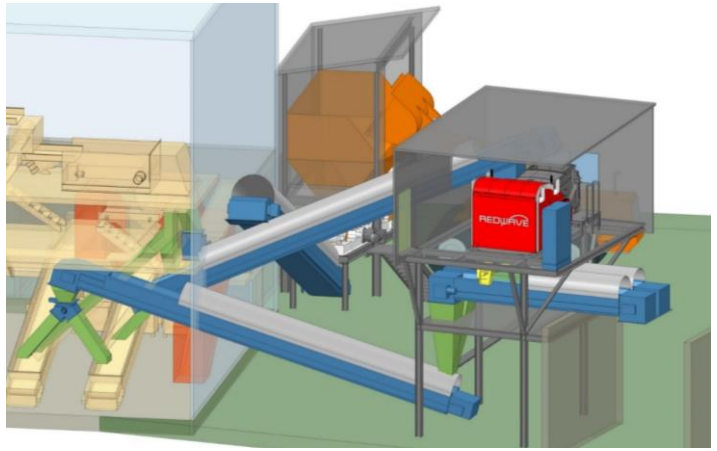
•Removal of remaining heavy metal impurities

XRF MACHINES INTEGRATION

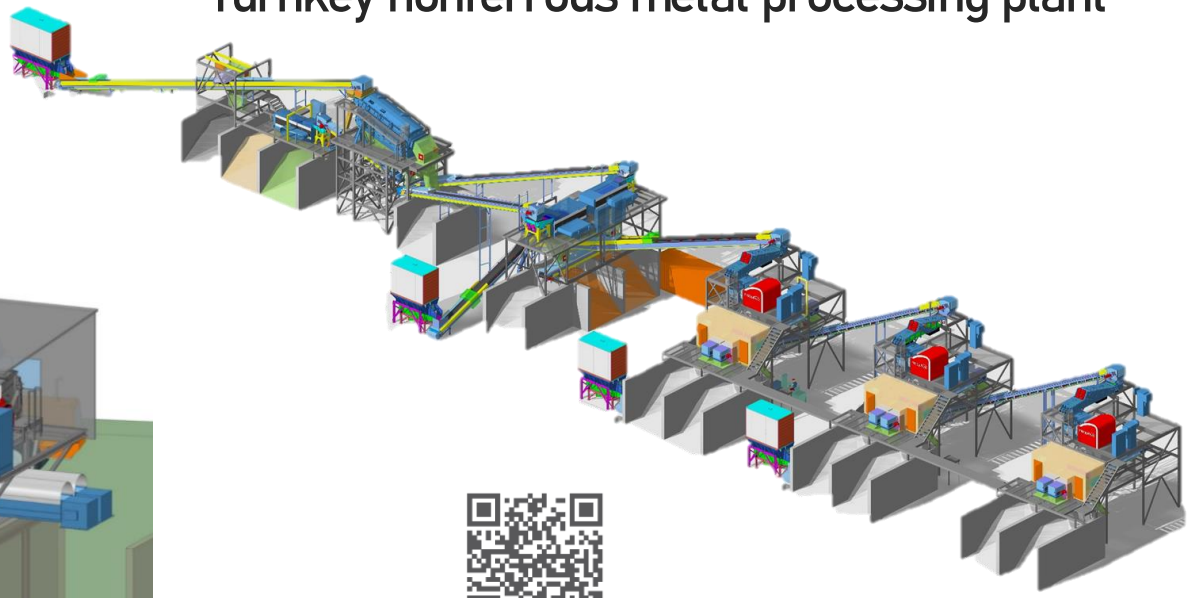
- Stand alone unit



- Plant extension



- Turnkey nonferrous metal processing plant



VIDEO >

WHY REDWAVE XRF SORTING MACHINES

- **Pioneer** in the development of cameras, sensors and XRF-based sorting machines
- **>1.000 REDWAVE sorting machines** operating worldwide (incl. **>100 XRF installations)**
- **>20 years experience building optical sorters; >12 years experience** in XRF development
- **Constant improvement and optimisation** of machine design through **know-how** accross multiple sorting applications
- Sole-source **turnkey** design, manufacturing and installation provider in the past 25 years

WHAT ARE THE ADVANTAGES OF THE REDWAVE XRF ?

- **Free-fall concept** and **combination of XRF and Camera** for precise detection and sorting
- **Compact footprint** facilitates easy plant integration
- **Minimal maintenance** due to no moving parts
- Capacities of up to 14 t/h for ZORBA sorting supports **profitability**
- Sorting widths: 450, 900 und 1370mm **easily upgradeable**
- Sortable material sizes from **5 to 180mm**

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NEXT GENERATION REDWAVE XRF

- Innovative sensor technology developed in house
  - Higher purities and increased efficiency
  - More independent from supply-chain and -bottlenecks
- Reduced downtime through optimised design
  - Improved accessibility for maintenance and cleaning
- New software-interface for simplified operation

Trials in RW Testcenter possible Winter 2022

EASY INTEGRATION - EASILY UPGRADEABLE

REDWAVE 450 XRF/C

- Sorting width of 450 mm

REDWAVE 900 XRF/C

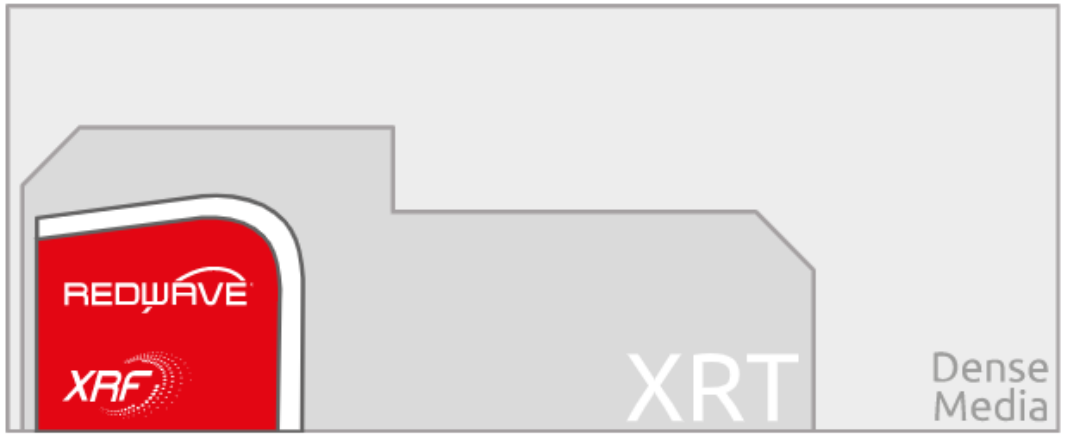
- Sorting width of 900 mm

REDWAVE 1370 XRF/C

- Sorting width of 1370 mm

SPACE REQUIREMENT

REDWAVE XRF
is the most compact non-ferrous sorting method available!



- All REDWAVE XRF/C machines come in the same housing of 1370 mm, making them easily upgradable

REDWAVE XRF REFERENCES WORLDWIDE

GRUPOTUA

REYDESA

CHARLES MUDDLE LTD

GMGG METRAN

HKS THE METAL COMPANY

ITALMETALLI

SDI La Farga, LLC.

GALLOO

cimco recycling, inc.

Rohstoffhandel Bernhard Westarp GmbH & Co. KG

RMB

DECONS SAS. RÉCUPÉRATIONS

CFO

LOACKER

mayer

RAFFMETAL

STENA RECYCLING

N.M. HEILIG B.V. HEILIG GROUP

HOAYI

SCANMETALS

CYCLAMEN

THANK YOU FOR YOUR ATTENTION