hamos
ADVANCED SEPARATION TECHNOLOGIES

Separation Technologies for Metal/Plastic Separation – hamos KWS

Worldwide market leader in electrostatic separation!

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About hamos

Worldwide #1 manufacturer of electrostatic separation machines & plants

1980
founded by Harro Müller-Stürcken in Gernany Penzberg

1993
Start of electrostatic separation technologies with hamos KWS

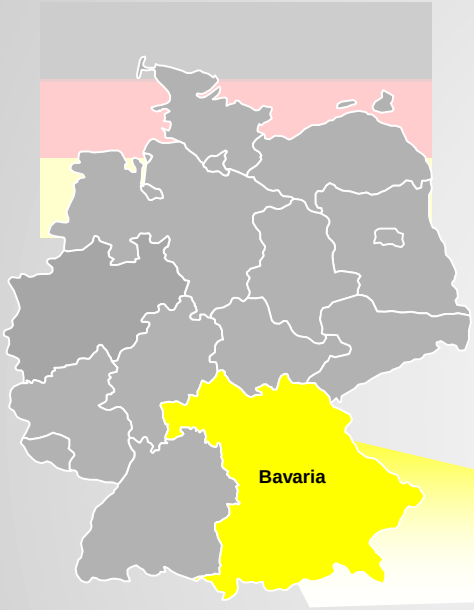
2000
Introduction of electrostatic separator hamos EKS

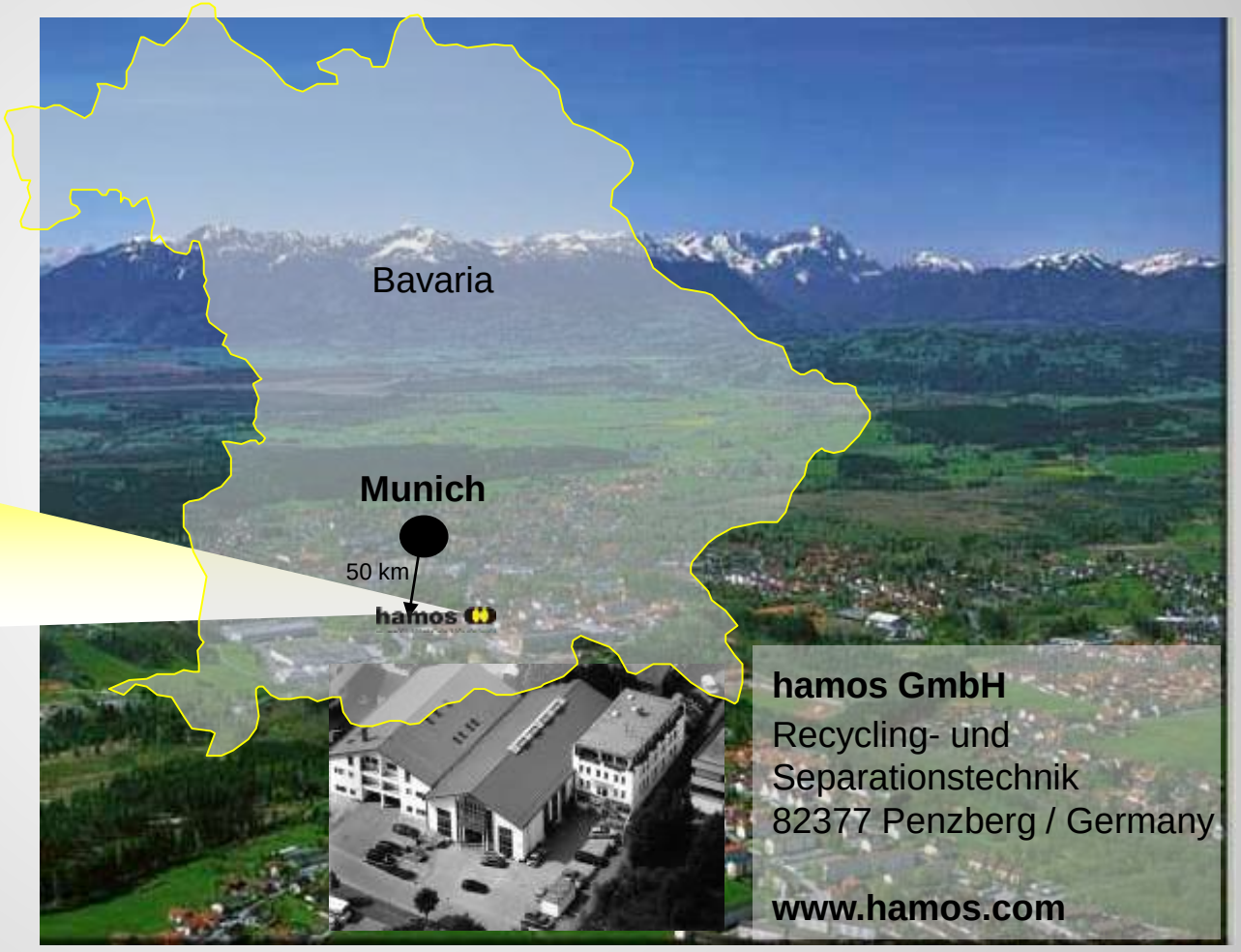
Becoming experts in the field of:

- Metal/Plastic Separation
- Plastic/Plastic Separation
- PVC Window Recycling
- WEEE-Plastic Recycling
- PET Recycling
- Cable Recycling

2014
Worldwide market leaders using hamos technologies

About hamos





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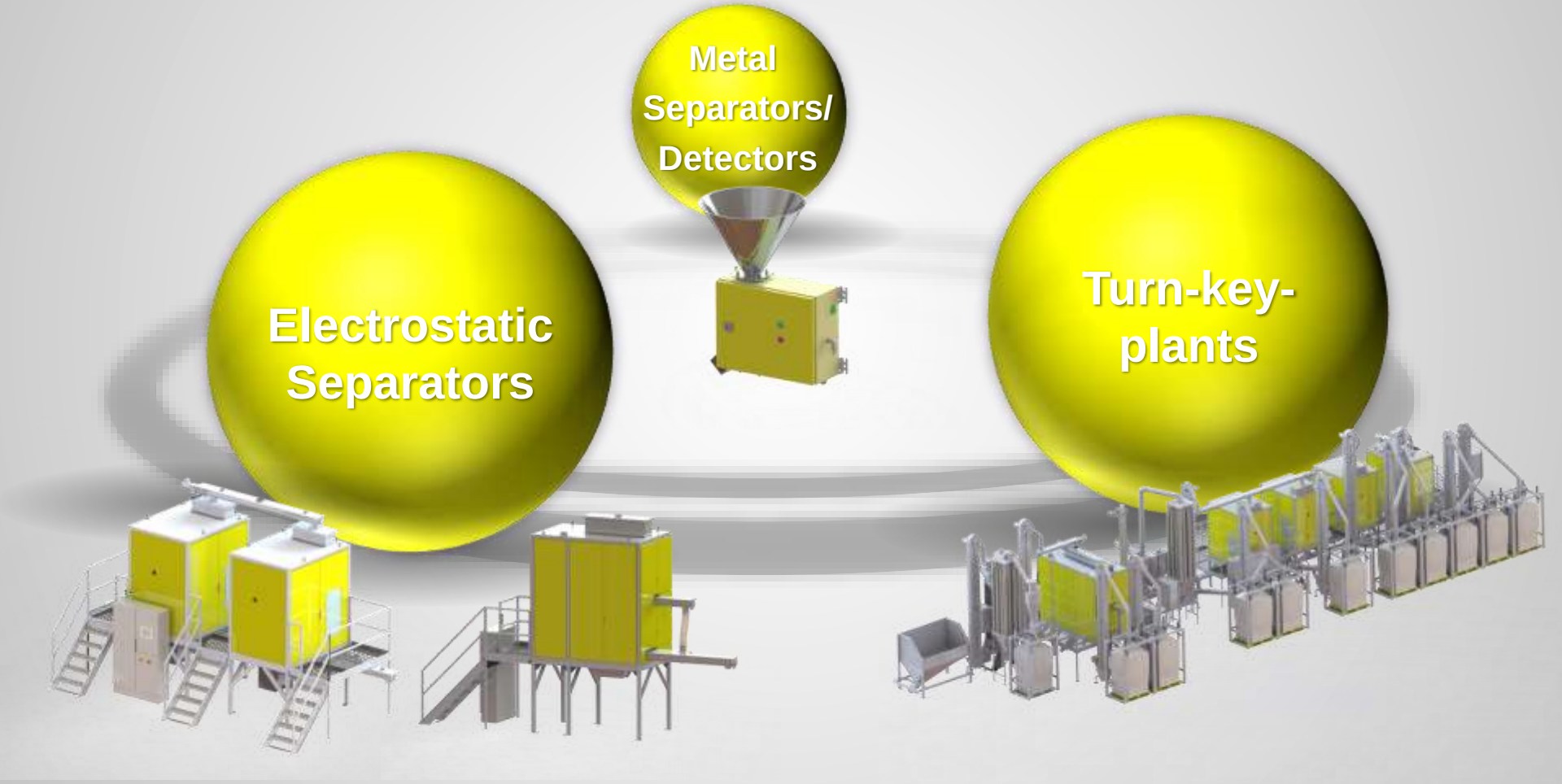
Product range



Product range

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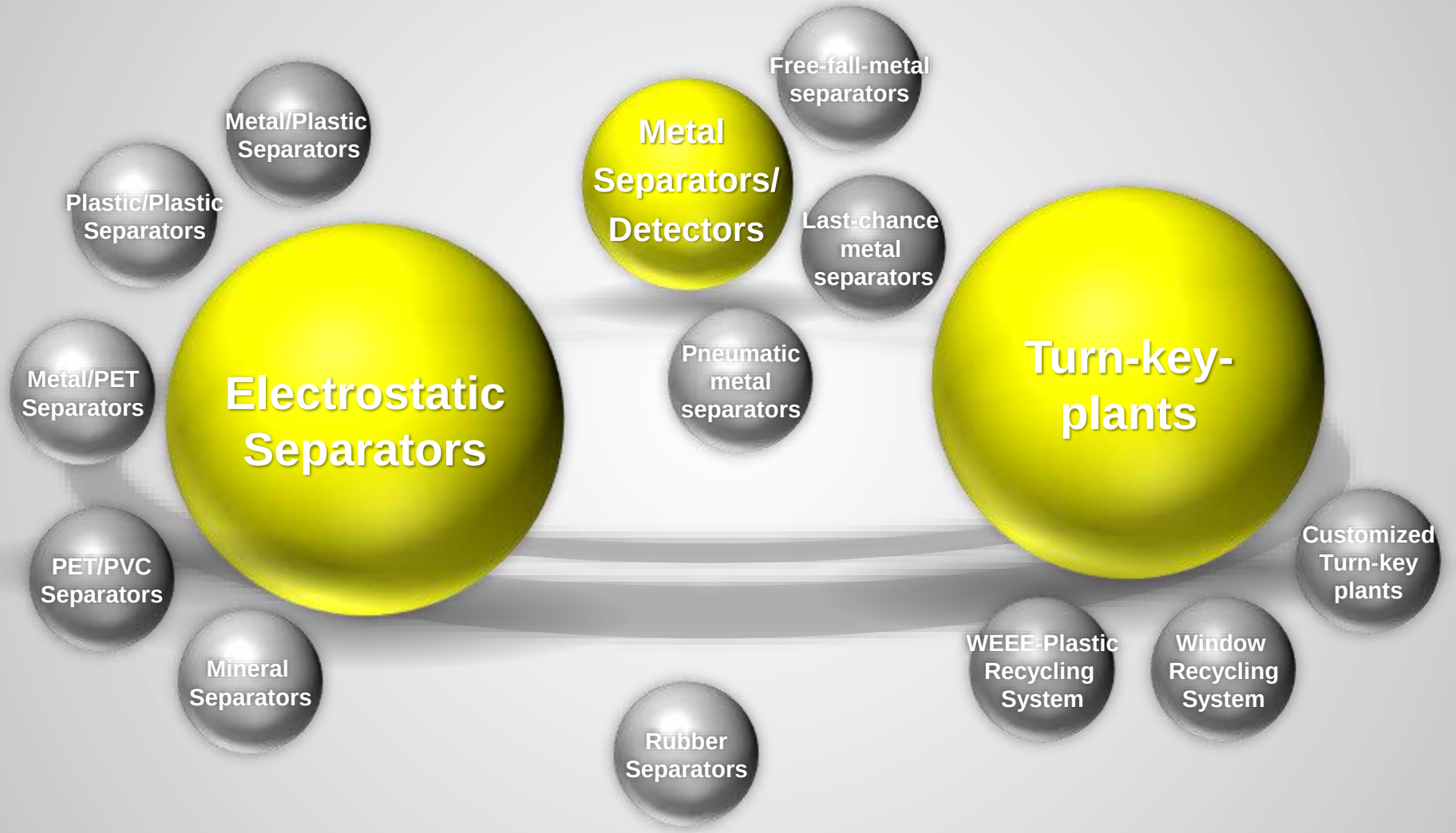

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Electrostatic metal/plastic separators

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Basics - Separation Technologies for metals

Metal Content	Ferrous		Non-Ferrous	
	Coarse	***Fine***	***Coarse***	***Fine***
Low	Magnets	Magnets	Electronic Metal Separators	Electronic Metal Separators
High	Magnets	Magnets	Eddy Current Separators	**KWS Electrostatic Separators**

Electrostatic metal/plastic separators

hamos KWS

Material pre-treatment

- Shredded
- Grinded
- Dryed
- Etc.

Material restrictions

- Wet and dusty products
- Compounds (not mechanically liberated)
- Oily/greasy/fibres/fuzz particles
- Coated conductors (i.e. oxidised metals like aluminium dross
- Sticking material

Electrostatic metal/plastic separators

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Main facts

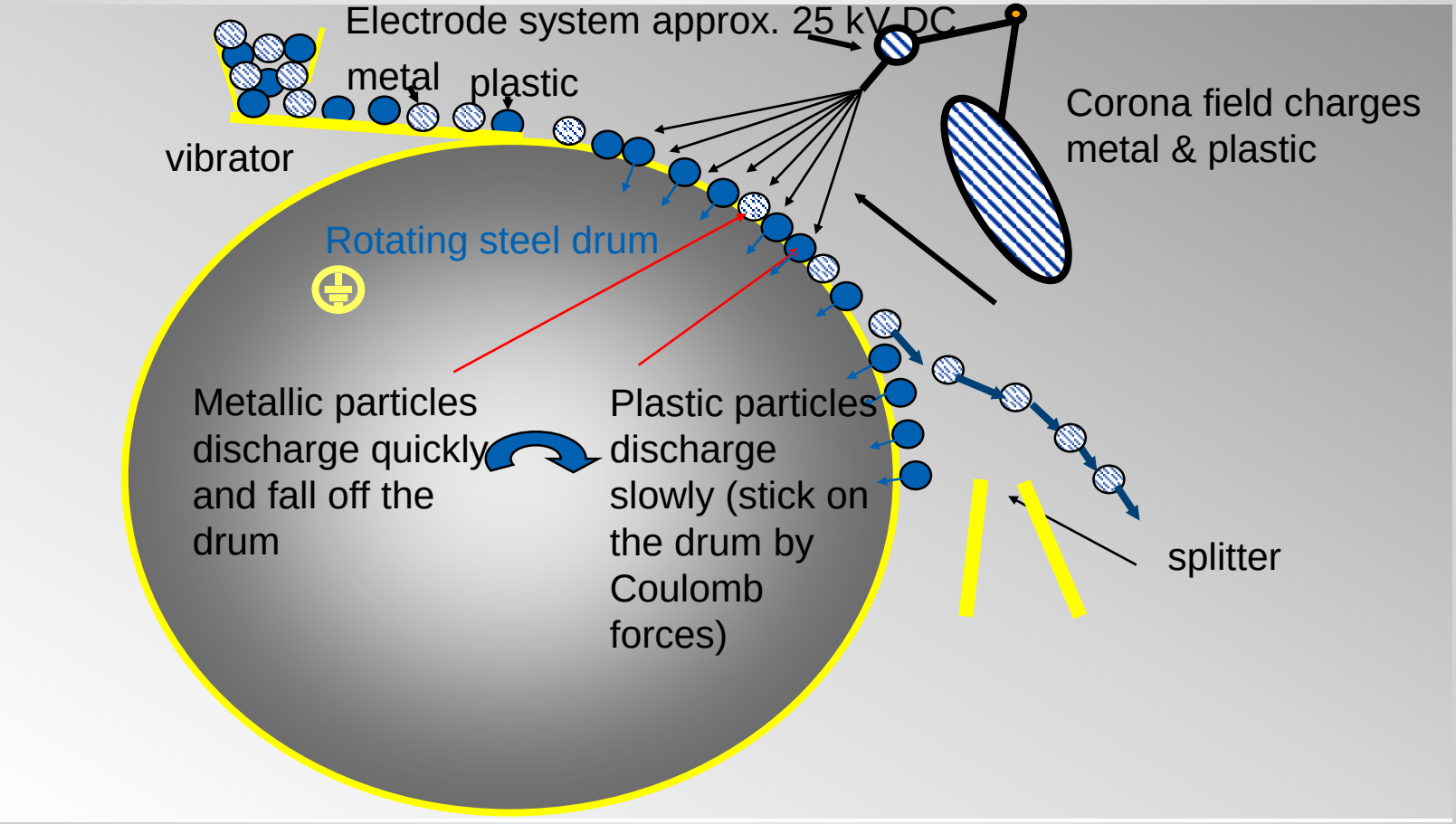
- Separation of conductors from non-conductors,
- Very fine metallic particles, high percentages of metals, cleaning of plastics (non conductors)
- Versatile applications with one KWS
- Dry separation process (no fluids or -chemicals necessary)
- Low sorting costs
- Throughput up to 1800 kg/hr

<u>The KWS is the ideal partner for</u>

- Shaker tables
- Eddy current separators

Electrostatic metal/plastic separators

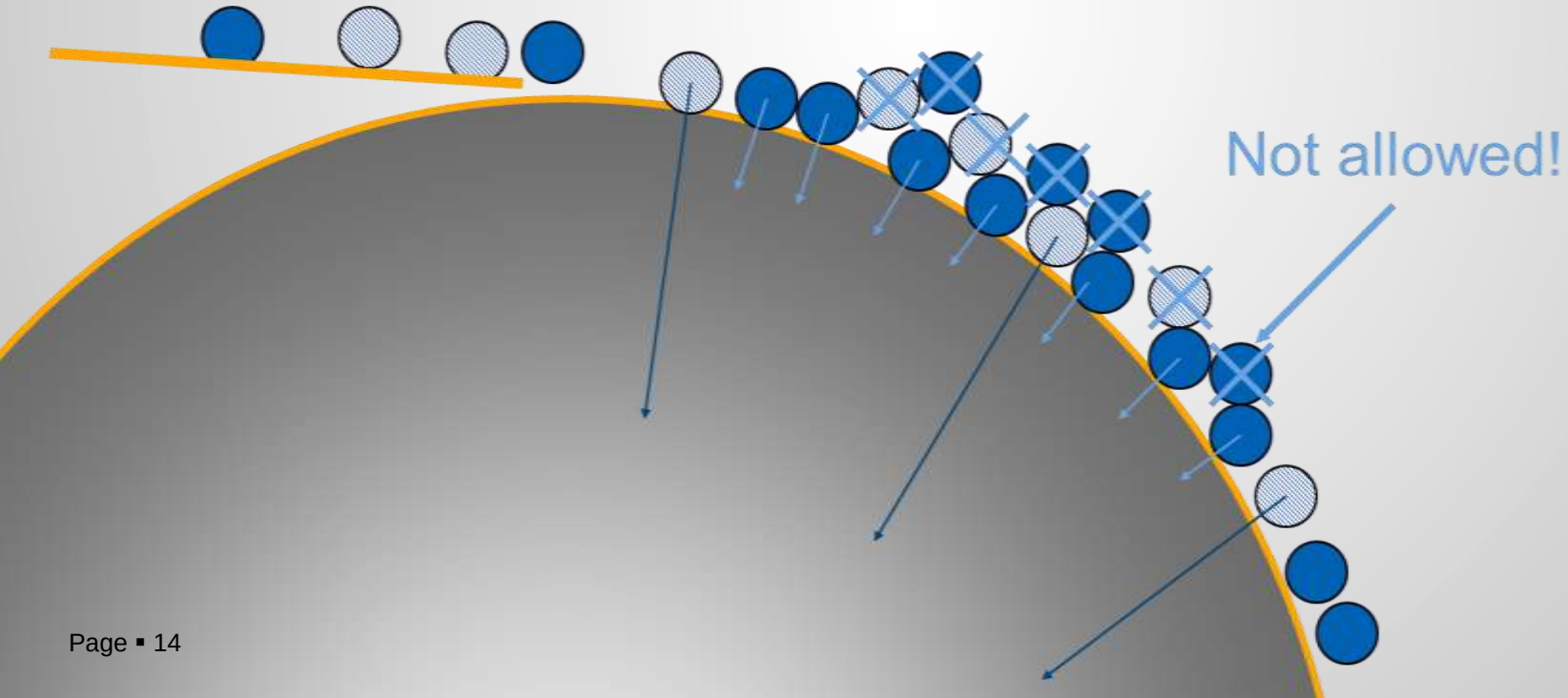
hamos KWS – Physics



Electrostatic metal/plastic separators

hamos KWS – Physics

- Only a single layer of particles can discharge on the surface of the drum
    - This limits the throughput
- Higher throughputs by increasing of the drum length (hamos KWS 1521-1: 2 x 1500 mm)



Electrostatic metal-plastic separators

hamos KWS – Internal De-dusting system – Delivered optional

Electrostatic metal/plastic separators

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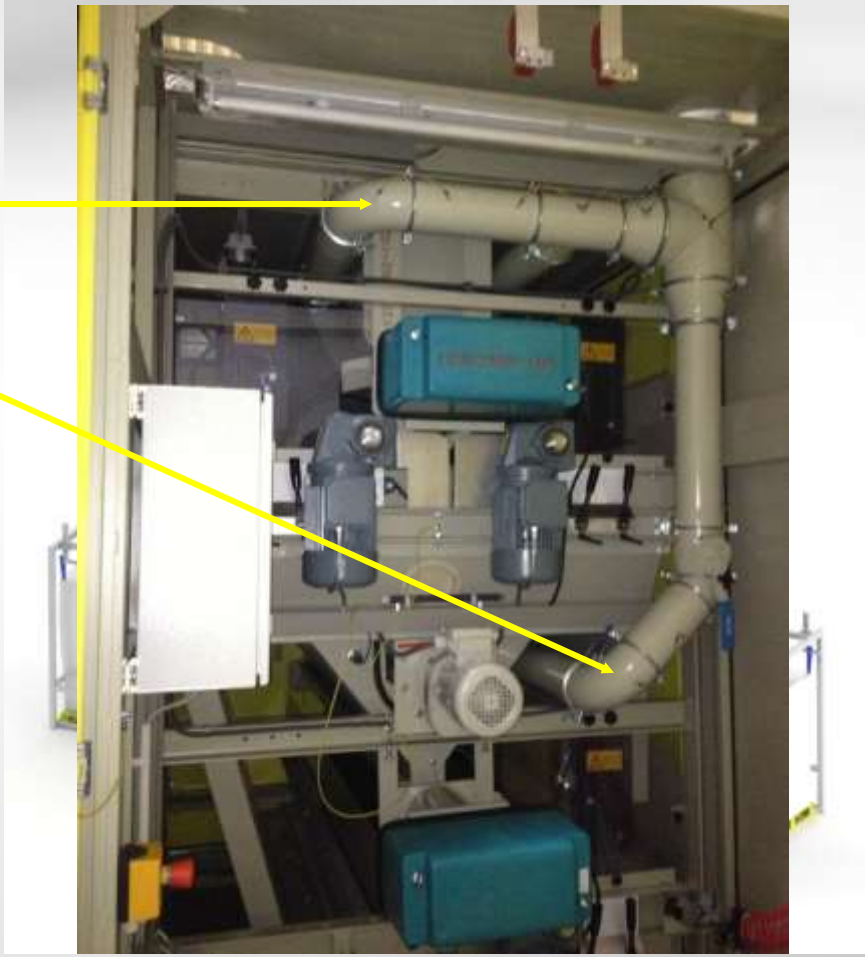
hamos KWS – Internal De-dusting system – Delivered optional

Internal De-dusting

Internal de-dusting system
on all drums is standard and part of the delivery

(to be connected to a filter system)



Electrostatic metal/plastic separators

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hamos KWS – Technical specs of KWS 1521/1522/2521/2522

- 2 parallel drums in the first separation stage
- 1 or 2 drums in the second stage
- Two stage separation
  → Re-separation of mixture and/or plastic product
- Drum length 1.000 mm (KWS 10xx)
  1.500 mm (KWS 15xx)
  2.500 mm (KWS 25xx)

Electrostatic metal/plastic separators

hamos KWS – 1010-0 Single Drum

Electrostatic metal/plastic separators

hamos KWS – 1521-1

Electrostatic metal/plastic separators

hamos KWS – 2522-2

Electrostatic metal/plastic separators

hamos KWS – Water table is no alternative

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Application examples

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Metal-plastic separators – hamos KWS

PVC Cable Scrap

Input

Clean copper

Plastic

Aluminum Cable Scrap

Input Alu/Plastic

Clean metal

Plastic

PC Boards

Input

Clean metal

Plastic

Joghurt scrap (skeleton waste)

Input

Clean Metal

Plastic

Further applications

Bottle caps

Alu/plastic

Alu-plastic tubes

Alu/plastic

Alu compounds

Alu/plastic

WEEE

Precious metals

Handys

Precious metals

PVC windows

PVC-metals

And many more

Application examples

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Cable recycling

Application examples

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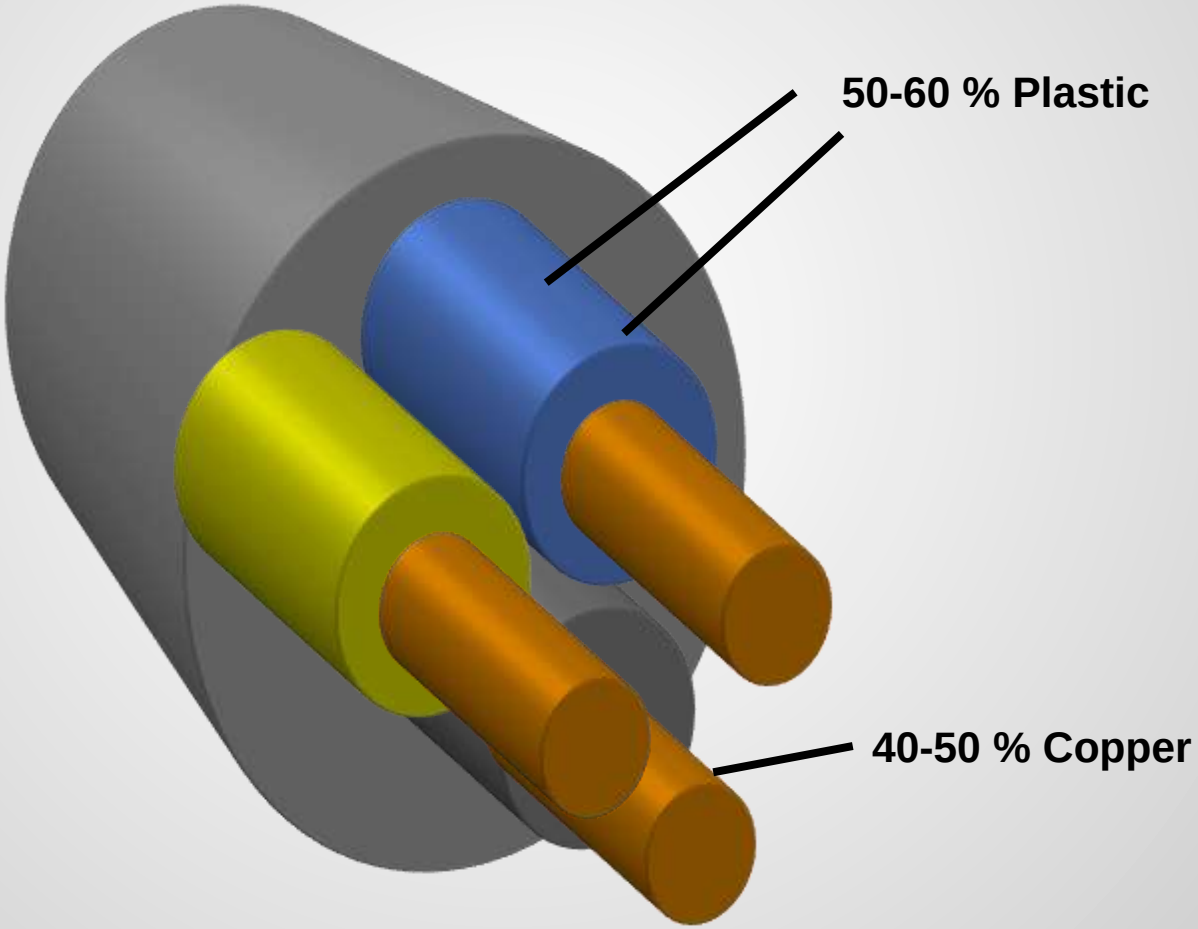
Cable recycling – Average composition of cable



Application examples

Cable Recycling – Chopping line

Shredding/Granulation for mechanical liberation of metals and plastics

↓

Sorting of metals and plastics with shaker table/air table

↓ Clean metal

↓ Metal containing wire tailings

↓

hamos KWS

Application examples

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Cable Recycling – Chopping line

Application examples

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Cable Recycling – Shaker table for clean metal

Metal

Plastic - This is the infeed for KWS!

Application examples

Cable Recycling – PVC Cable

Input material

Typical input material mixture of PVC cable material

Metal fraction

Metal fraction after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

Application examples

Aluminum Cable

Input material

Typical input material mixture of aluminum cable material

Metal fraction

Metal fractions after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

Application examples

Mixed Cable

Input material

Typical input material mixture of mixed cable

Metal fraction

Metal fraction after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

Application examples

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Cable Recycling – Filter lifetime increased by 800 %

Application examples

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Recycling of PC board scrap & router dust I

PRODUCT

- Ground bare or populated PC boards (epoxy, fibre, copper, precious metal) particle size < 1mm
- Metal content approx. 20 %

TARGET

- 100 % metal recovery, clean epoxy

SOLUTION

- hamos KWS

Application examples

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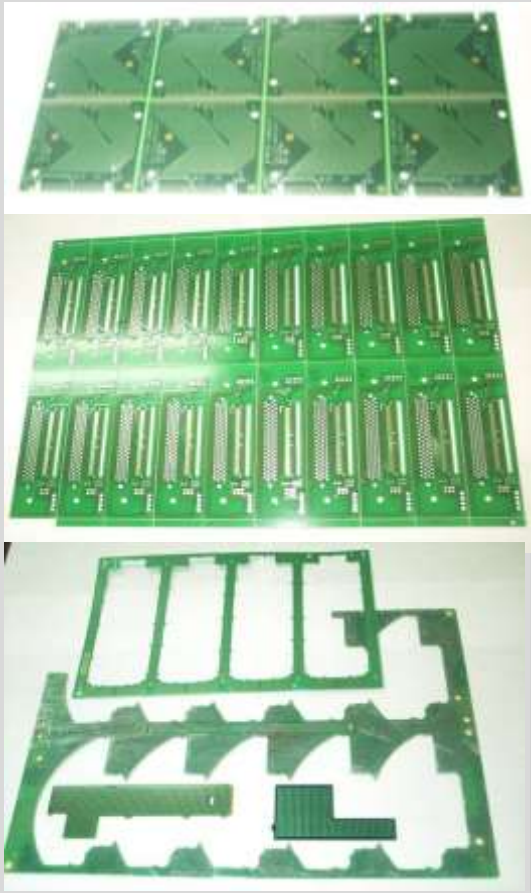
Recycling of PC board scrap & router dust I

Plain PC board scrap

- No components
- No precious metals
- ~ 20% copper, tin, lead
- Single, double, multi-layer
- Thin copper layers
- Epoxy, glass fiber



Application examples

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Recycling of PC board scrap & router dust I

- Digital components
- +10 different metals
- Single, double, multi-layer
- **Contains precious metals**
- Different non-metals

Application examples

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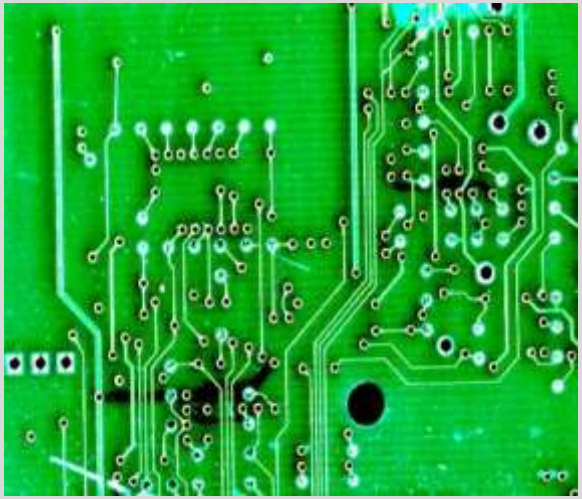
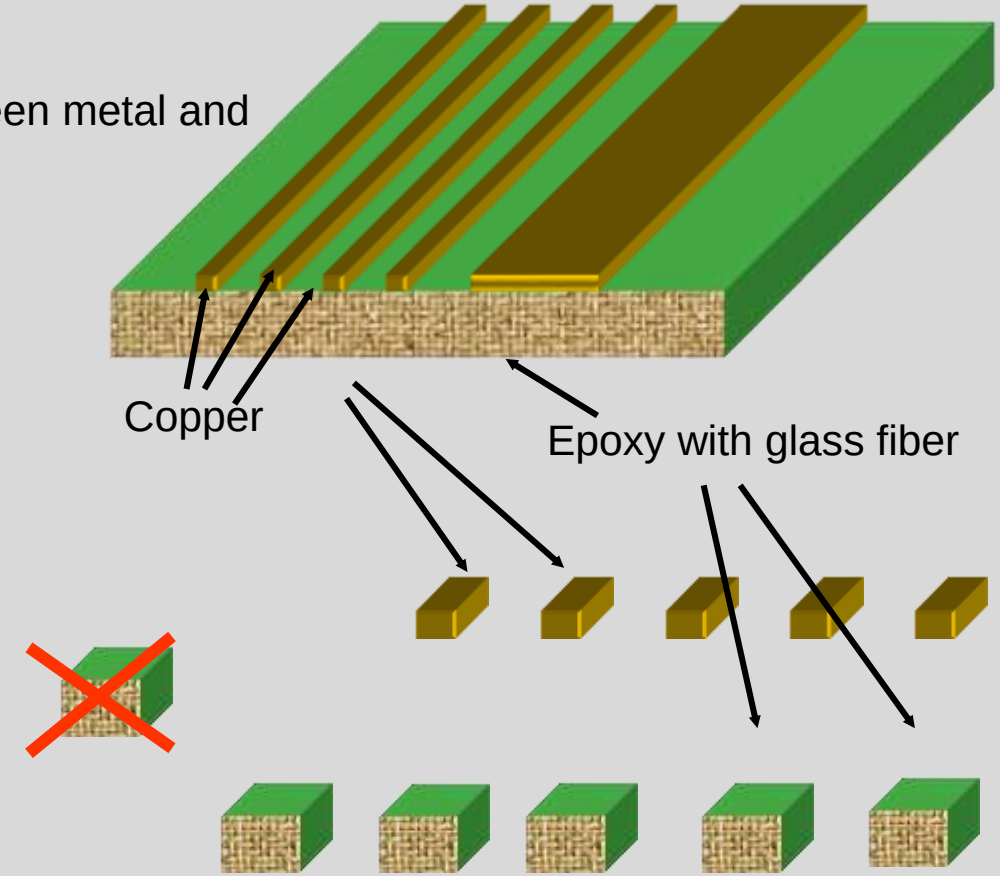
Recycling of copper clad laminates

- Fine Conductors
- Mechanical liberation between metal and epoxy





Application examples

Recycling of PC board - Principle

Shredding for mechanical liberation

↓

Pulverisation for metal/non-metal liberation

↓

Separation of metal and non-metal with KWS

↓ ↓

Clean metal | Non metallic

Application examples

PC Boards

Input material

Typical input material mixture of PC Boards

The ideal fraction size is 1,6 – 2,5 mm

Metal fraction

Metal fraction after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

Application examples

PC Boards

Input material

Typical input material mixture of PC Boards

The ideal fraction size is

< 1,6 mm

Metal fraction

Metal fraction after hamos KWS

Residues fraction

Residues fraction after hamos KWS

Application examples

WEEE Plastic cleaning

Input material

Typical input material mixture of WEEE plastic

Metal fraction

Metal fraction after hamos KWS

Non conductor fraction

Non conductor fraction after hamos KWS

Application examples

Router dust

Input material

Contains > 15% copper

- Phenolic or glass
- Fibre/epoxy can be re-used

Metal fraction

Copper fraction after hamos KWS. Impurities like rubber aso. are removed

Non conductor fraction

Phenolic or glass fibre/époxy

Application examples

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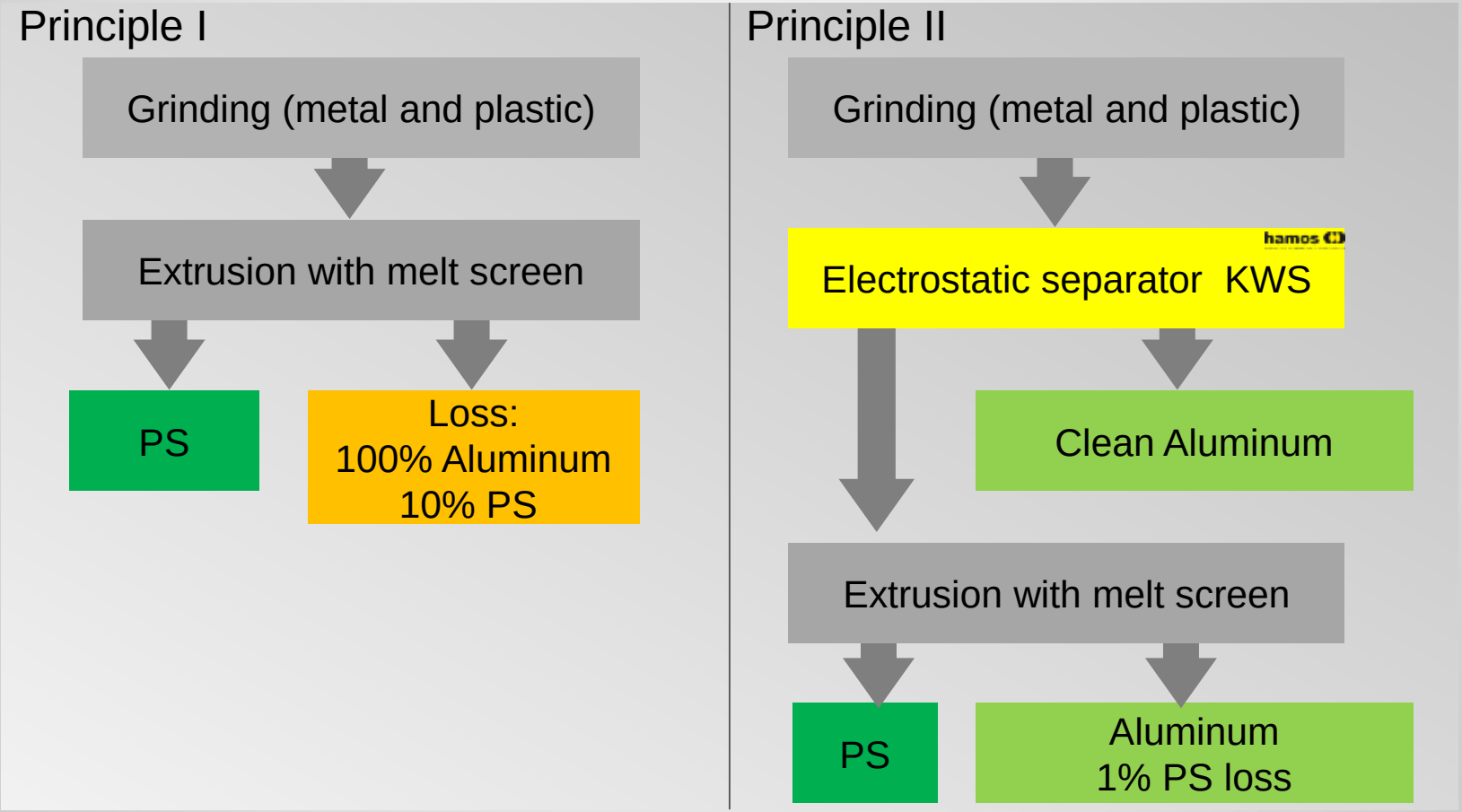
Recycling of skeleton waste – Principles



Application examples

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Punch scrap / skeleton waste

Input material

Ground skeleton waste (PS and 10-20 % aluminum)

- Originated from dairy products production wastes (we are working on post consumer cups etc.)

Metal fraction

Aluminum recovery after hamos KWS

Plastic fraction

Clean plastic fraction PS for new products (plant containers etc.)

Application examples

Bottle caps

Input material

Typical input material mixture of Bottle caps

Metal fraction

Aluminum recovery after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

Application examples

Aluminum/plastic pipes

Input material

Typical input material mixture of Alu-plastic tubes

Metal fraction

Metal fraction after hamos KWS

Plastic fraction

Plastic fraction after hamos KWS

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References

hamos worldwide

And many more…

References

Installed hamos KWS 1521-1

References

Installed hamos KWS – 2521-1 and KWS 2521-1

References

Installed hamos KWS – 2522-2 and KWS 2521-1

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