

September 2013

3.
Problemska Konferenca
Komunalnega Gospodarstva

19. In 20. September 2013
Terme Olimia, Podčetrtek

September 2013



Titel:

Moderne Technologien in Postopki za ločevanje sekundarnih sestavin iz odpadkov v kombinaciji z inovativnimi napravami

„Latest sorting technologies for recyclable fractions in Praxis“

Ernie Beker, RTT Steinert GmbH

- RTT-STEINERT key facts
- NIR-technology developed by RTT
- basics optical sorting
- latest NIR-technology with Hyper Spectral Imaging
- different Sorting Applications
- possible applications for Slovenia

RTT-Steinert – in general

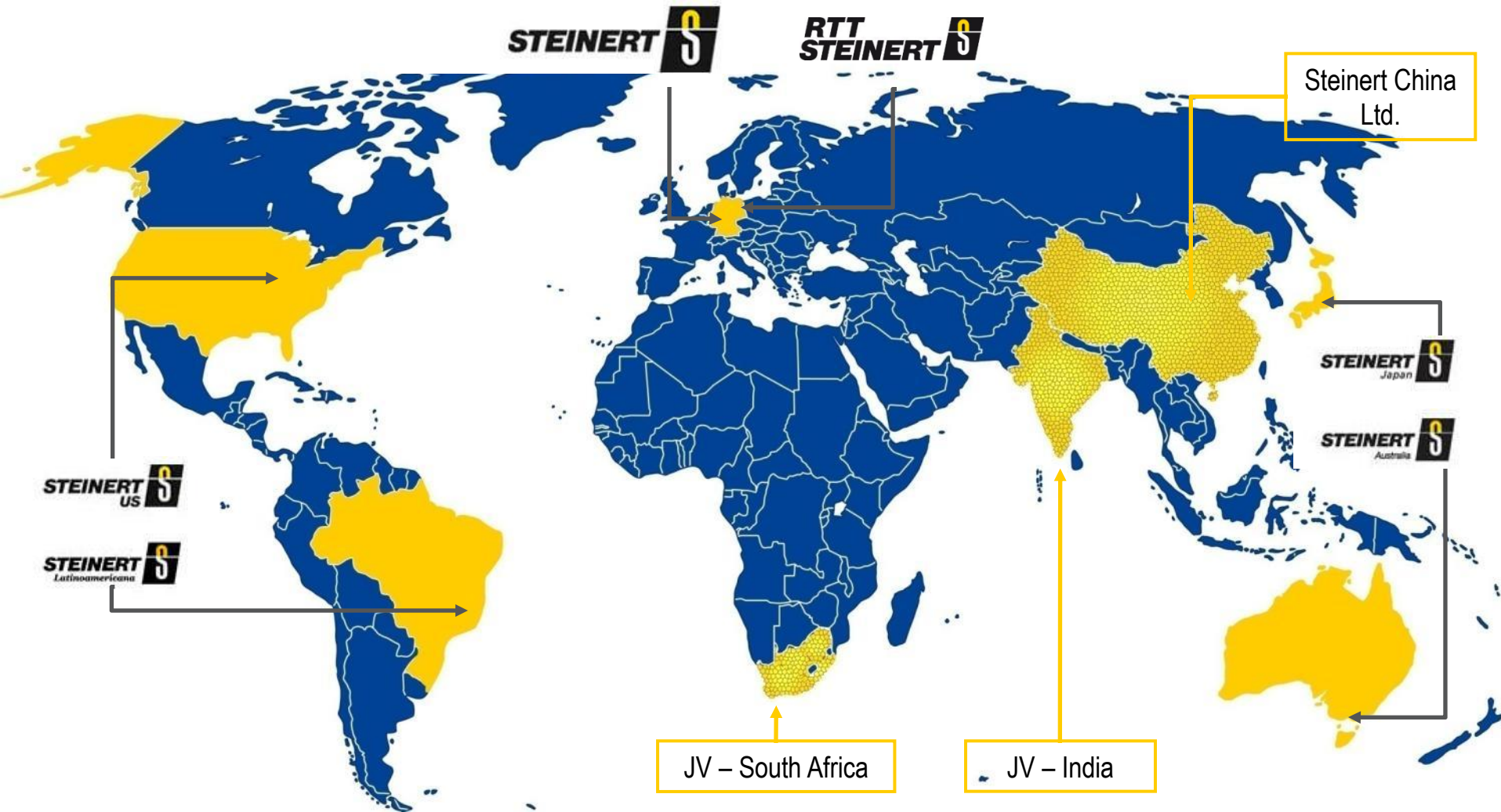
- RTT was founded 13 years ago in Zittau
- STEINERT was founded more than 120 years ago in Cologne
- RTT and STEINERT merged in 2009
- More than 45 employees in production and developing located in Zittau
- Long tradition in building sensor based sorting technologies for the waste market
- A very young product portfolio



Position of RTT-STEINERT in the STEINERT group

- STEINERT - as a full range supplier with an innovative sensor based sorting line - was looking for a capable partner with proven NIR-technology.
- RTT-STEINERT with the brand UniSort is responsible in the group for sensor based applications in waste.
- Experience from both companies ended up in a new product line.
- RTT-STEINERT is able to use the existing worldwide sales net from STEINERT.

STEINERT-Company Group–Worldwide Sales through S + Joint Ventures (JV)



1. Ferrous separation



MTP/MTE

Pickup drum
Clean ferrous



MOR

Cleaning up
Ferrous free product



BRP

Cleaning up (fines)
Ferrous free product



UME/UMP

Pick up losses

2. Non-ferrous separation



NES

NF separation
Clean NF product

3. Sensor based sortings



ISS

Inductive sensor
Metal free waste / SS



UniSort

color-sensor, NIR, Plastic, Waste, Bottle,
Copper wire / wood, RDF, WEEE, etc.



XSS

X-ray T
Alu from NF



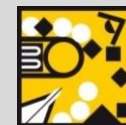
XRF

X-ray F
Alloy SS + Alloys NF



ISS 3D

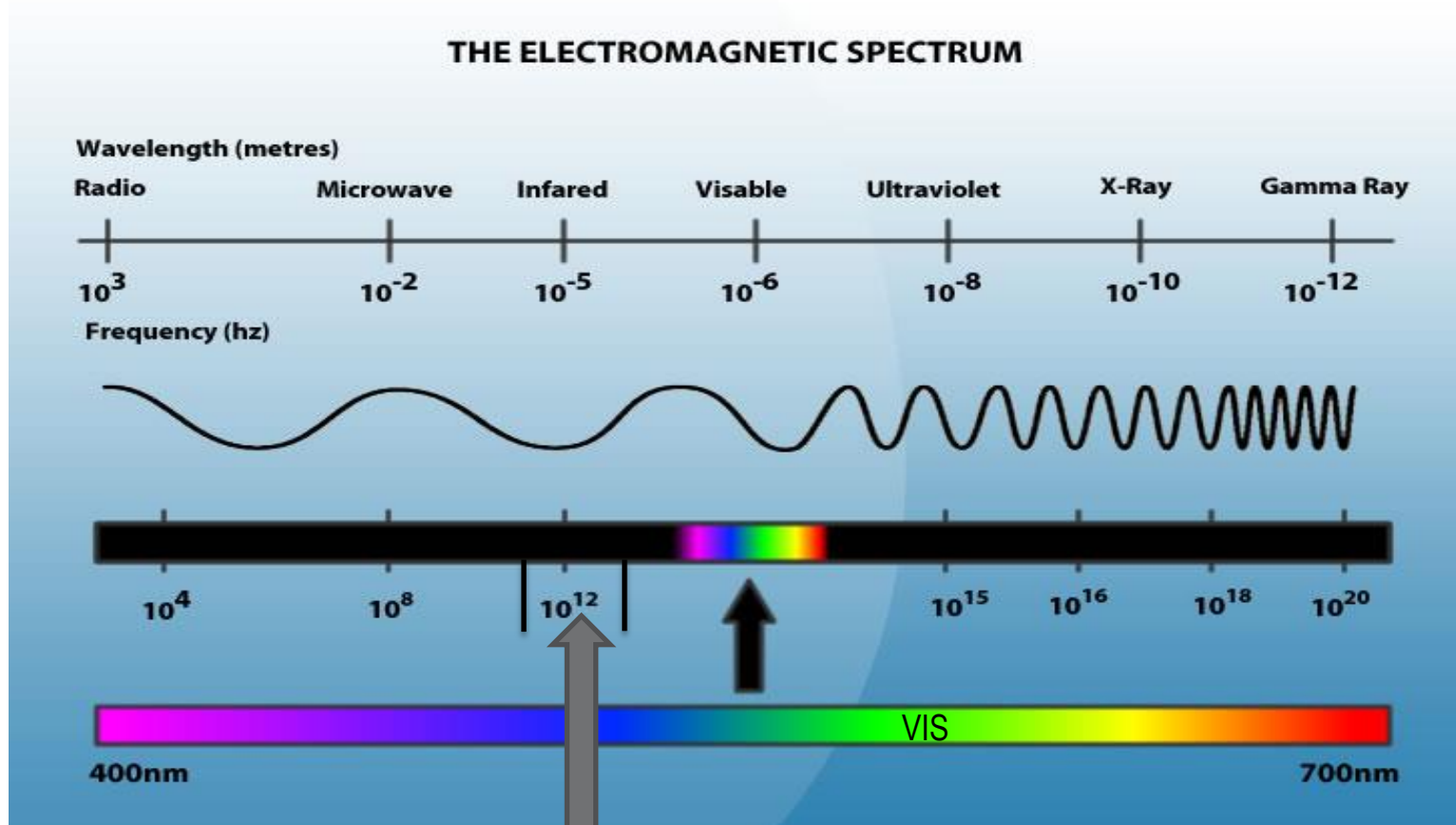
Real Shape detection
ICW / PCB



ISS 3D color

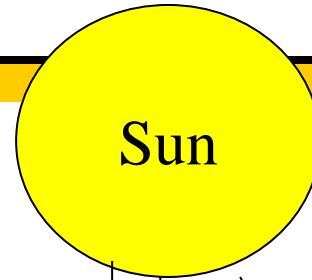
Color detection
Colored NF-metals

Electromagnetic Spectrum



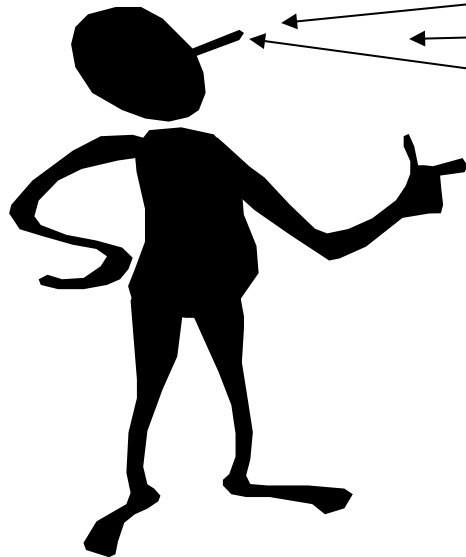
NIR 780-2500 nm
(for humans invisible)

what is
Near Infrared radiation?



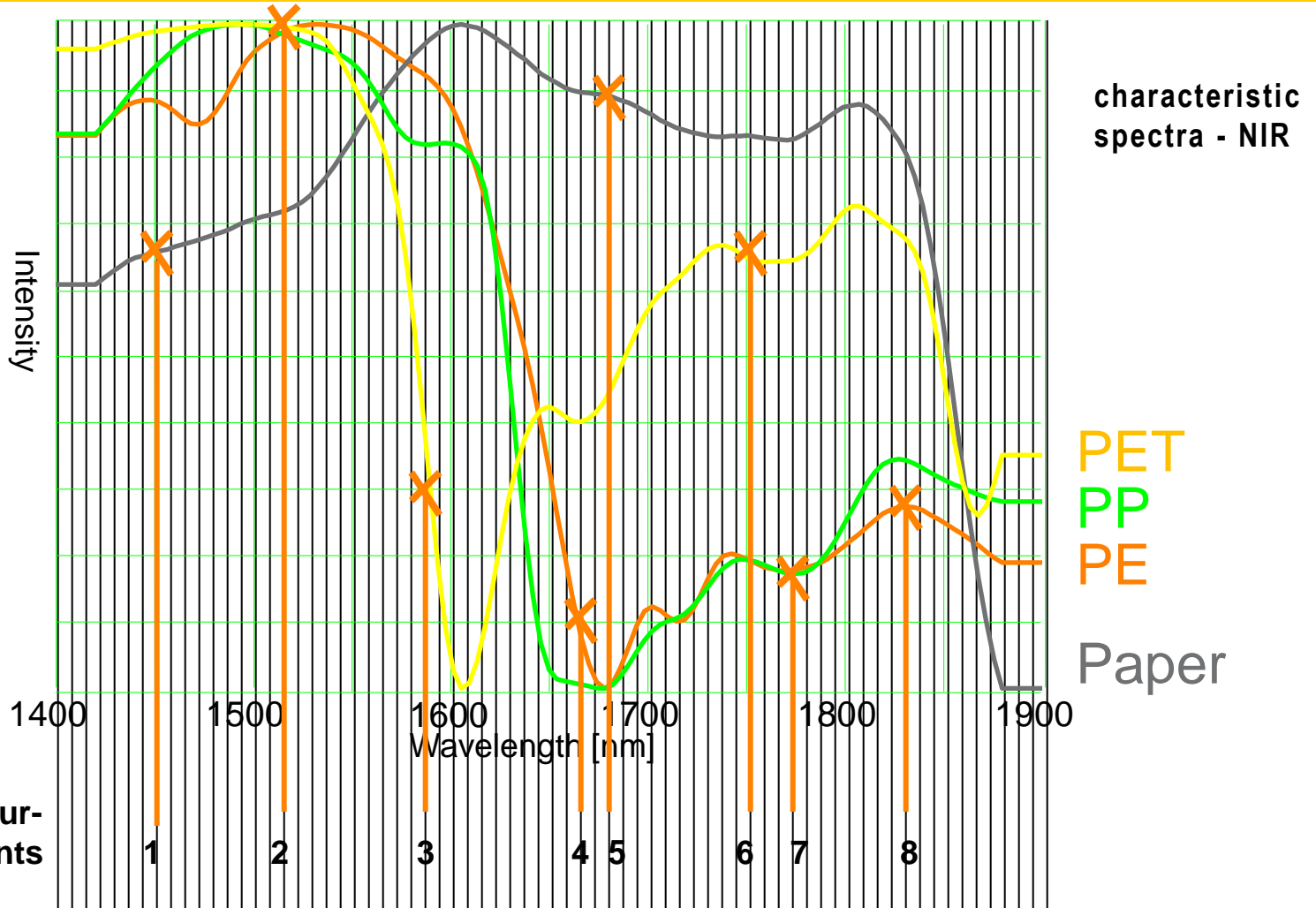
green	497-530 nm
blue	450-482 nm
red	620-780 nm

NIR (780-2500 nm)
(for humans invisible)



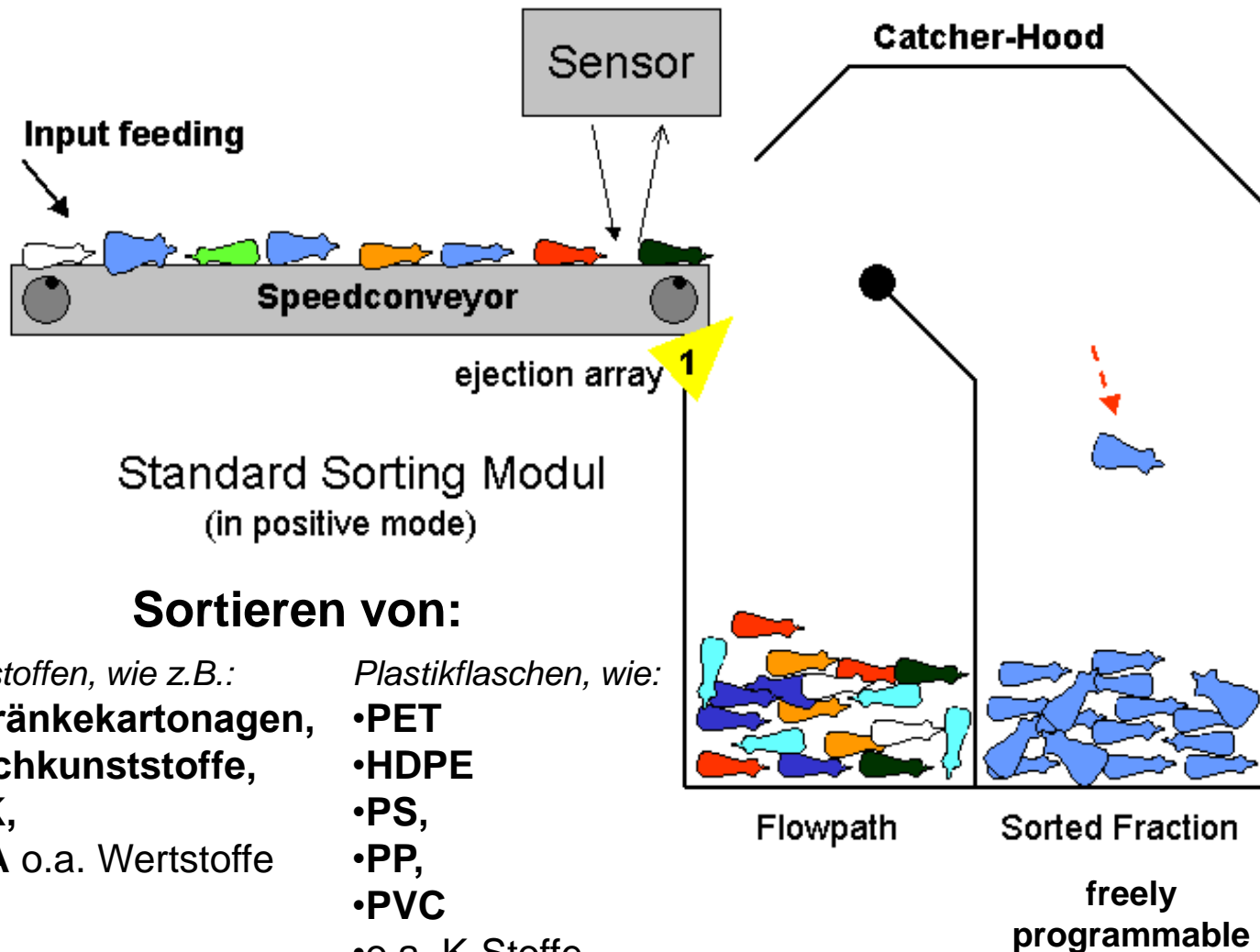
visible wavelength range for humans:
approx. 380-780 nm

What means spectral resolution?



Measuring 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21-----119 120 121 122 123 124 125 126 127 **128**
points

Basic Prinzip



Wertstoffen, wie z.B.:

- **Getränkekartonagen,**
- **Mischkunststoffe,**
- **PPK,**
- **PGA** o.a. Wertstoffe

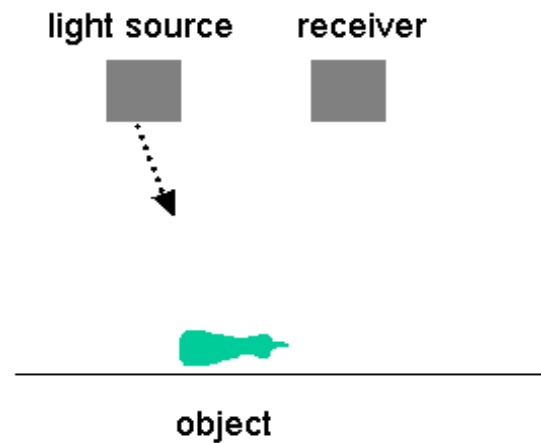
Plastikflaschen, wie:

- **PET**
- **HDPE**
- **PS,**
- **PP,**
- **PVC**
- **o.a. K-Stoffe**

Sensor Types

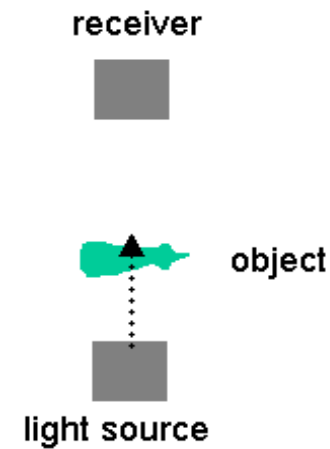
UNISORT[®] PR

Reflection



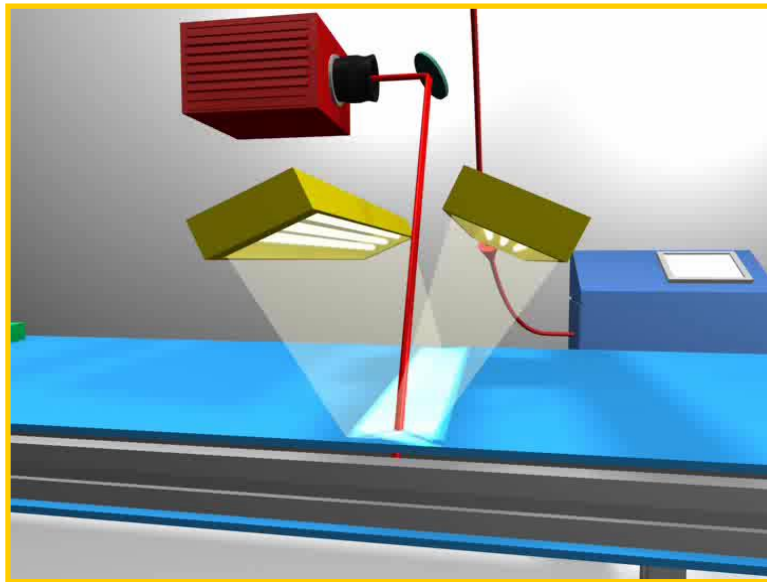
UNISORT[®] C

Transmission



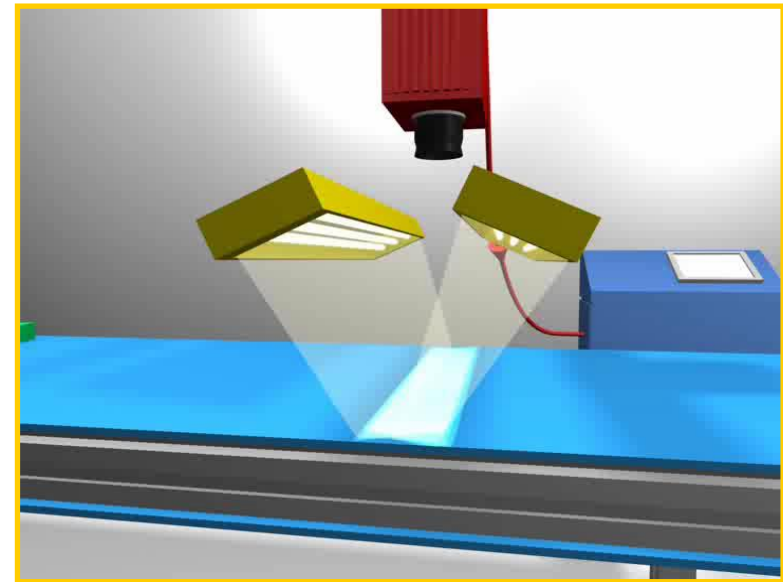
State of the art in sensing and sorting

Point to point scanning standard system



- Light is only needed in the scanned area
- Rotating optical parts (mirror)

State of the art line scan UniSort PR



- Scanning hole belt needs light at any point
- No rotating optical parts due to HSI-camera

UniSort Flake P and C



Sorting of Flakes

fraction range size

3 - 20 mm

UniSort PR (redeye)

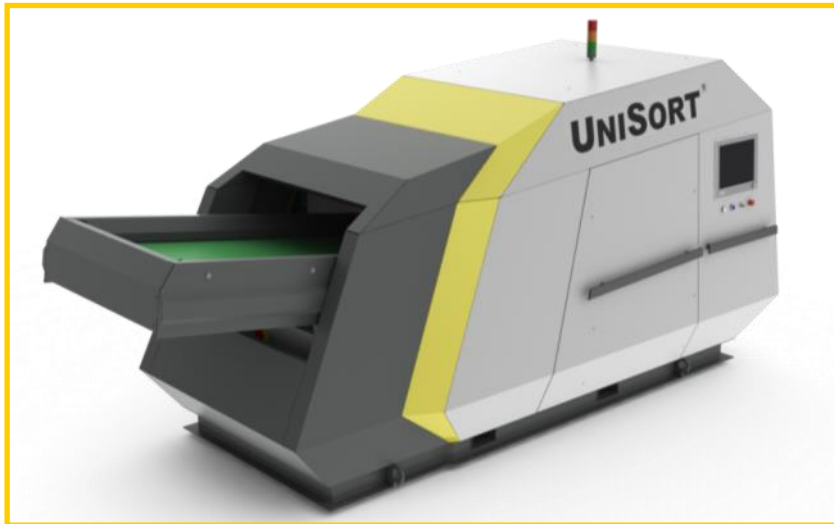


Sorting of Recyclables

fraction range size

10 - 300 mm

UniSort P Flake



Nozzle and valve bar

For all applications as from
6.25 mm nozzle gap

Technical Data

- | | |
|------------------------|---|
| ■ Feeding material: | PET / PE / PP / PS / ABS flakes, ASR |
| ■ Resolution local: | 2 mm |
| ■ Resolution spectral: | < 3 nm (Hyper Spectral Imaging HSI) |
| ■ Nozzle gap: | 6.25 mm (12.5 mm also available) |
| ■ Fraction size: | from 5 mm |
| ■ Light system: | Halogen |
| ■ Sorting width: | 750 mm |

Application

Flakes



1. UniSort C Flake basically about Flake C Sorter



UniSort C Flake Sorter is available in:

- Reflection-model to sort opaque materials
- Transmission-model to sort transparent materials



UniSort Flake C Trans.
Transmission-model
lighting from below



UniSort Flake C Refl.
Reflection-model
lighting from above

Technical Data

- Feeding material: PET coloured,
- Resolution local: < 1 mm
- Nozzle gap: 6.25 mm
- Fraction size: from 5 mm
- Light system: LED
- Sorting width: 750 mm

Application 1

e.g. PET bottle Flakes,
transmission- model



Application 2

e.g. PE Flakes,
reflection- model



Nozzle and valve bar
For all applications as from
6.25 mm nozzle distance

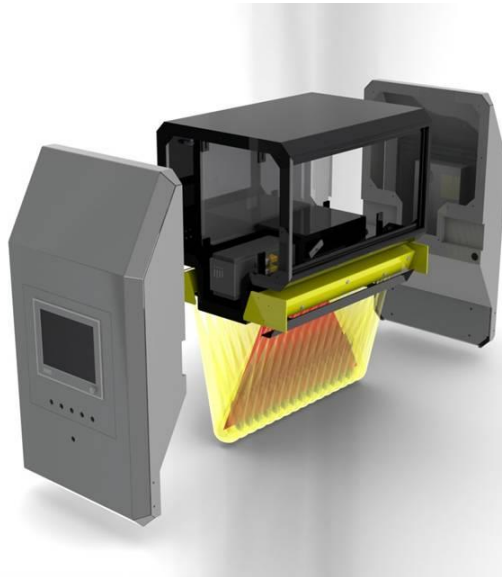


Sensor, control unit, operating panel and lighting bridge are complete housed in a shapely cabinet, Speed-Conveyor, material-Catcher hood with rotating material splitter, pneumatic adjustable air-nozzle bar, pressure tank with air service unit. Complete mounted on a metal base frame.

RTT Steinert „ Plug and Sort Solution“

-up to 2,8 Meter wide (110 inch), Fraction range size 10-350 mm (1/2 - 14 inch)

UniSort PR with HSI



Technical Data

- Feeding material : mixed plastics, packaging waste, paper, wood...
- Resolution local : 3 - 6 mm
- Resolution spectral : <3 nm
- Nozzel gap : 12,5 mm, 22,5 and 31 available
- Fraction size : from 10 mm up to 300 mm
- Lightning : 800 W/m, halogen
- Sorting width : 1000, 1400, 2000, 2400 and 2800 mm

Application

Household waste



Plastics





3.1 | Video: UniSort PR and Flake



UniSort P Flake: Application ABS



UniSort Flake P 750 running with shredded ABS / PS

Grain size 5-25 mm with 1,25 t/h

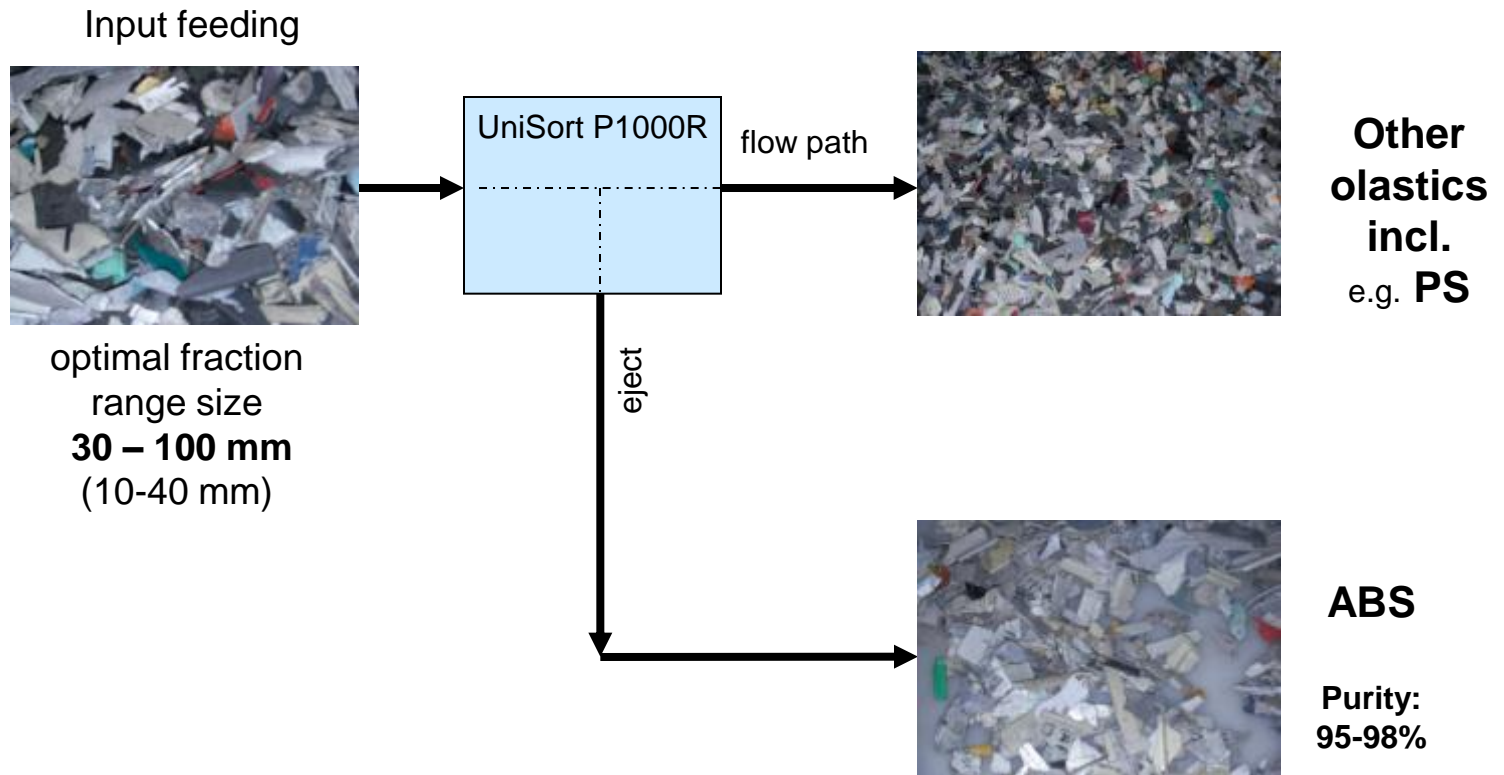
UniSort P Flake: Application ABS



UniSort Flake P 750 running with shredded ABS / PS

Grain size 5-25 mm with 1,25 t/h

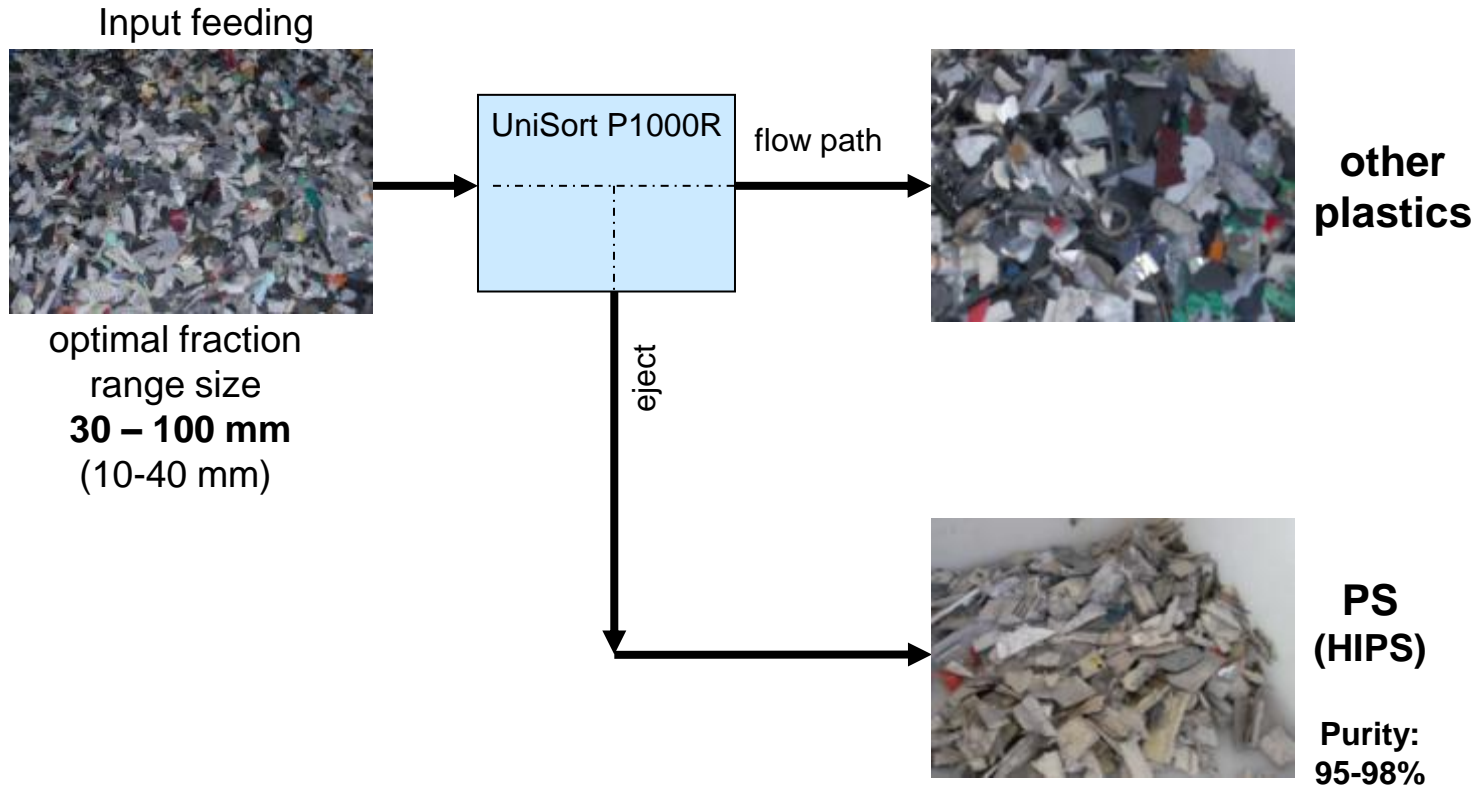
1. ABS positive sorting



purity of the sorted fraction : > 95% up to 98 %

Removal efficiency : > 80 %

2. PS (HIPS) positive sorting



purity of the sorted fraction : > 95% up to 98 %

Removal efficiency : > 80 %

ABS
sorted fraction first run

PS (HIPS)
sorted fraction first run



4.0 | UniSort: Statistic and analysis any time (in addition to the February Newsletter)

UniSort Flake P and C



we remember !

UniSort PR (redeye)



easy access via touch-screen

For internal and external: quality management

Recording statistical data`s

- belt capacity
- material statistic
- online overview
- valve statistic

and more – next page

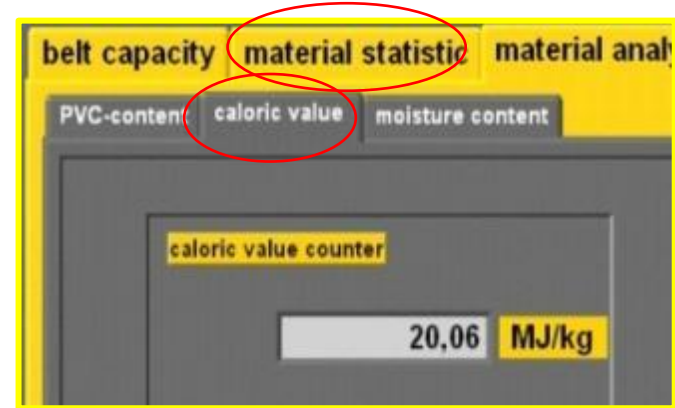


4.1 | UniSort: Statistic and analysis any time

(in addition to the February Newsletter)

Operating data-record - particularly for RDF plants:

- caloric value in MJ/kg
- PVC content in %
- material composition in %
- relative moisture in %
- belt capacity (operating grade)
- plant downtime



e.g.: caloric value



display the data`s on your work station

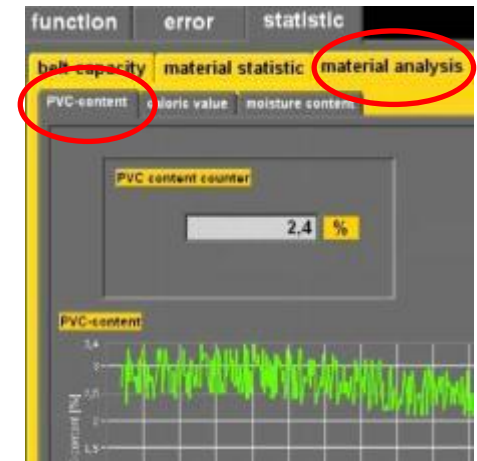
to be informed any time:

whether on workplace

or mobil



display the data`s on your iPhone



e.g.: PVC content

2.0 | High Quality: PET Flake Sorting by NIR

PET Flake trial in Zittau 18.04.2013

UniSort P Flake



Nozzle and valve bar
For all applications as from
6.25 mm nozzle gap

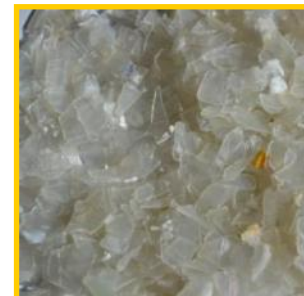
This trial is made with PET Flakes from one of the greatest fiber producer in Europe. They process more than 60.000 t/year

Technical Data

- Feeding material: PET / PE / PP / PS / ABS flakes, ASR
- Resolution local: 2 mm
- Resolution spectral: < 3 nm (Hyper Spectral Imaging **HSI**)
- Nozzle gap: 6.25 mm
- Fraction size: from 4 mm
- Light system: Halogen
- Sorting width: 750 mm

Application

PET Flakes



2.1 High Quality: PET Flake Sorting by NIR

PET Flake trial in Zittau 18.04.2013



PET Flake delivered by fiber manufacture:

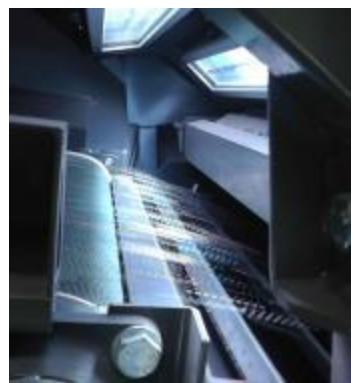
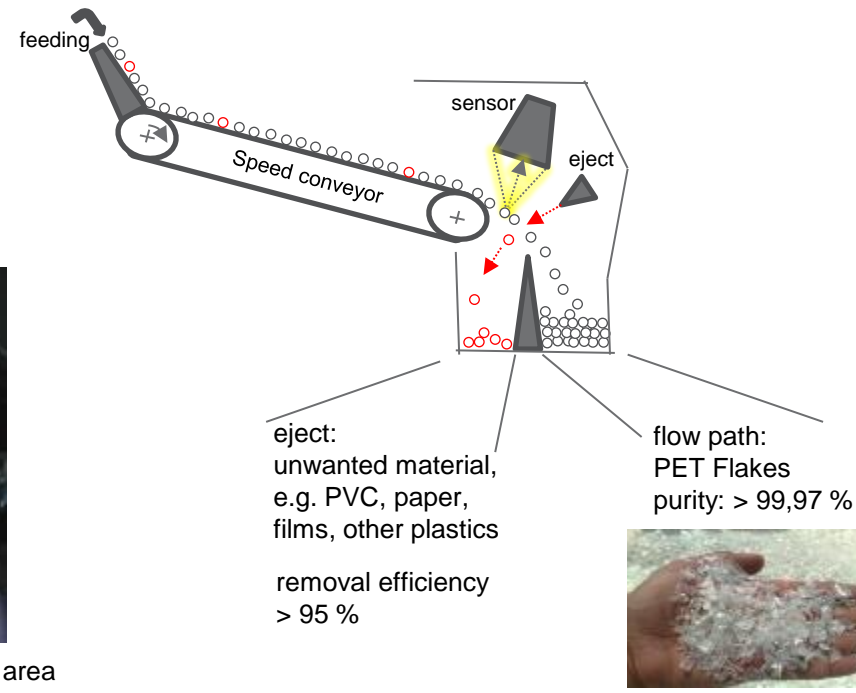
- 4 x big-bags with 220 kg each
- 1 x big-bag with 870 kg
- fraction range size: 4-12 mm

Big-bags from customer

1. trial: feedmaterial 220 kg in 17 min. ; capacity: about 800 kg
2. trial: feedmaterial 116 kg in 6,5 min. ; capacity: about 1.000kg



Flake Sorter in production



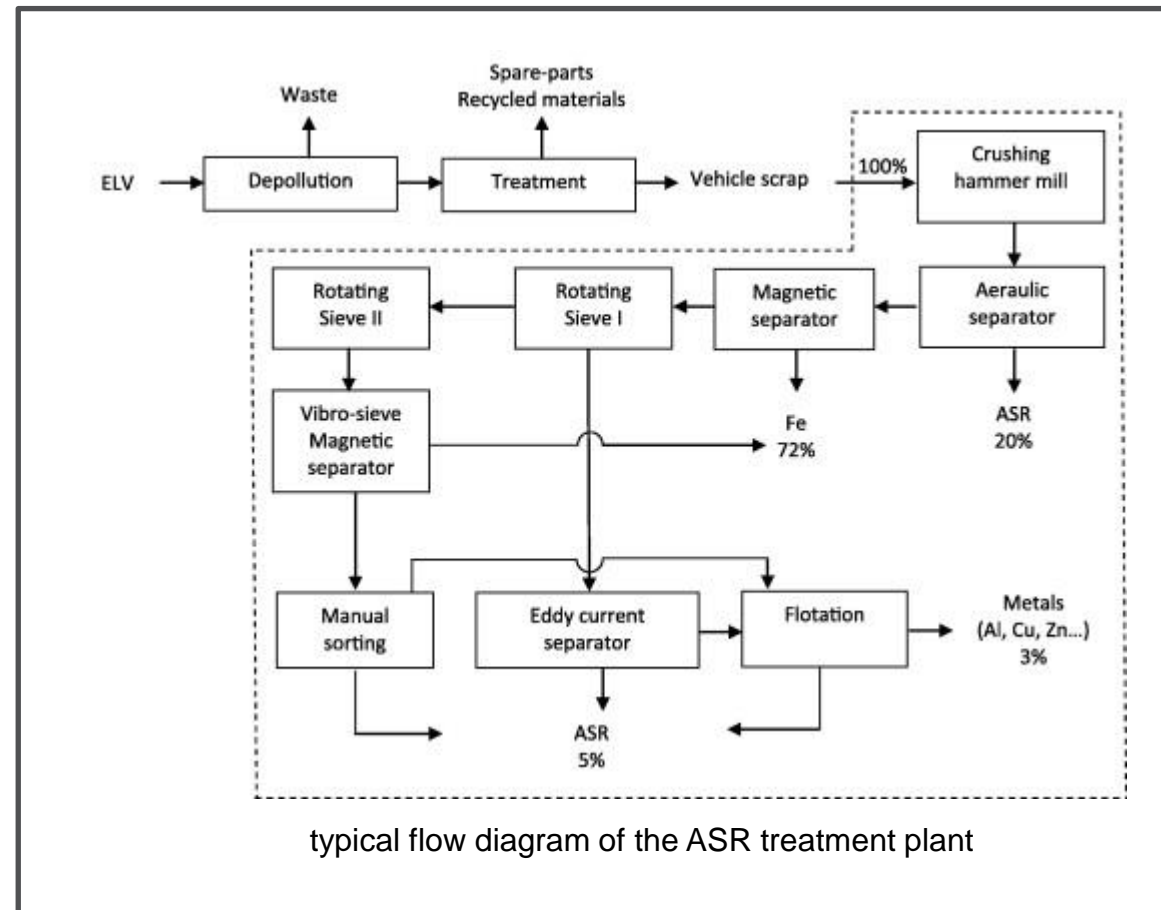
UniSort Flake P, detection area

3.0 | ASR – Automotive Shredder Residue

UniSort P 1000 RF - test in place with ASR



End-of-life vehicles (ELVs)



3.1 | ASR – Automotive Shredder Residue

UniSort P 1000 RF - test in place with ASR



Technical Data

- | | |
|------------------------|--|
| ■ Feeding material: | mixed plastics, packaging waste, paper, wood |
| ■ Resolution local: | 3 - 6 mm |
| ■ Resolution spectral: | < 3 nm |
| ■ Nozzle gap: | 12,5 mm |
| ■ Fraction size: | from 10 mm up to 300 mm |
| ■ Light system: | 800 W/m, Halogen |
| ■ Sorting width: | 1000, 1400, 2000 and 2800 mm |

F= fine grain version, nozzle distance 12,5 mm

UniSort P 1000 RF



Application

ASR



3.2 | ASR – Automotive Shredder Residue

UniSort P 1000 RF - test in place under full terms conditions
by one firm of Europe leader in recycling of ELV

After crushing, screening, metal separation and swimm-sink process
they are mixture of wood and plastics.

The Task: clean-up the plastics from wood



UniSort P1000RF

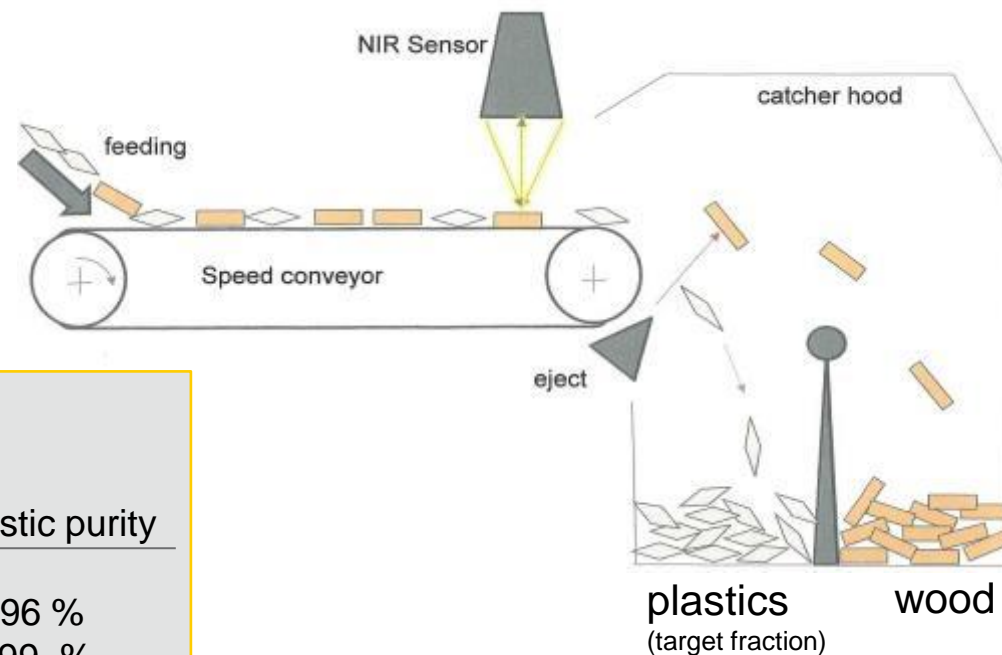


ASR light fraction after swim/sink
conglomerate of plastic and wood

3.3 | ASR – Automotive Shredder Residue

UniSort P 1000 RF - test in place with ASR

All result numbers below
is recorded and evaluated by
plant operator in long term trials



Test results made in May / June 2013:

Sorting width	Capacity	fraction range size	plastic purity
1 m	4 t/h	0 - 30 mm	96 %
1 m	8 t/h	30 - 120 mm	99 %

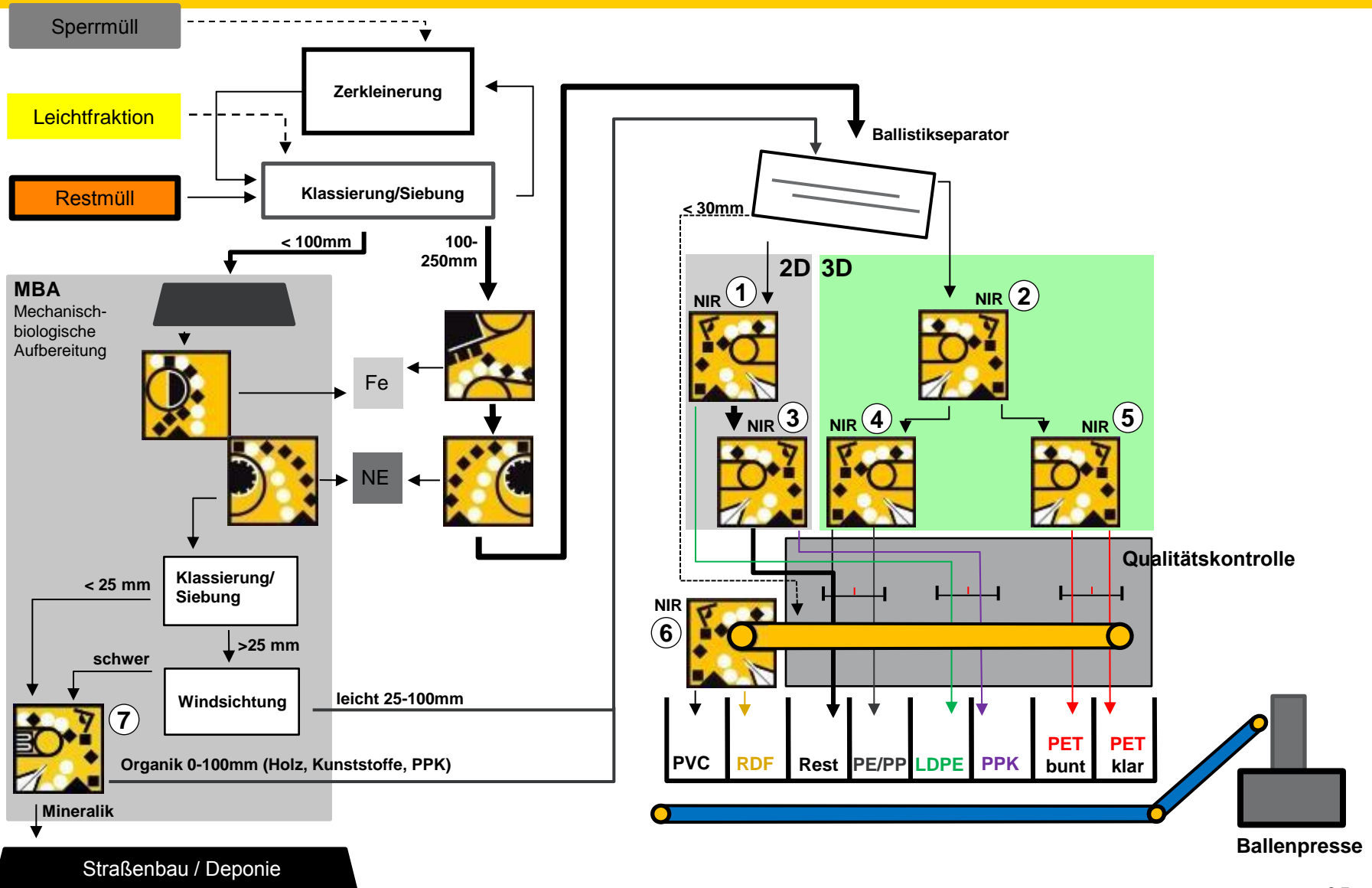
in comparison to competitor (same trial procedure)

2,8 m	7-8 t/h	0-120 mm	90 %
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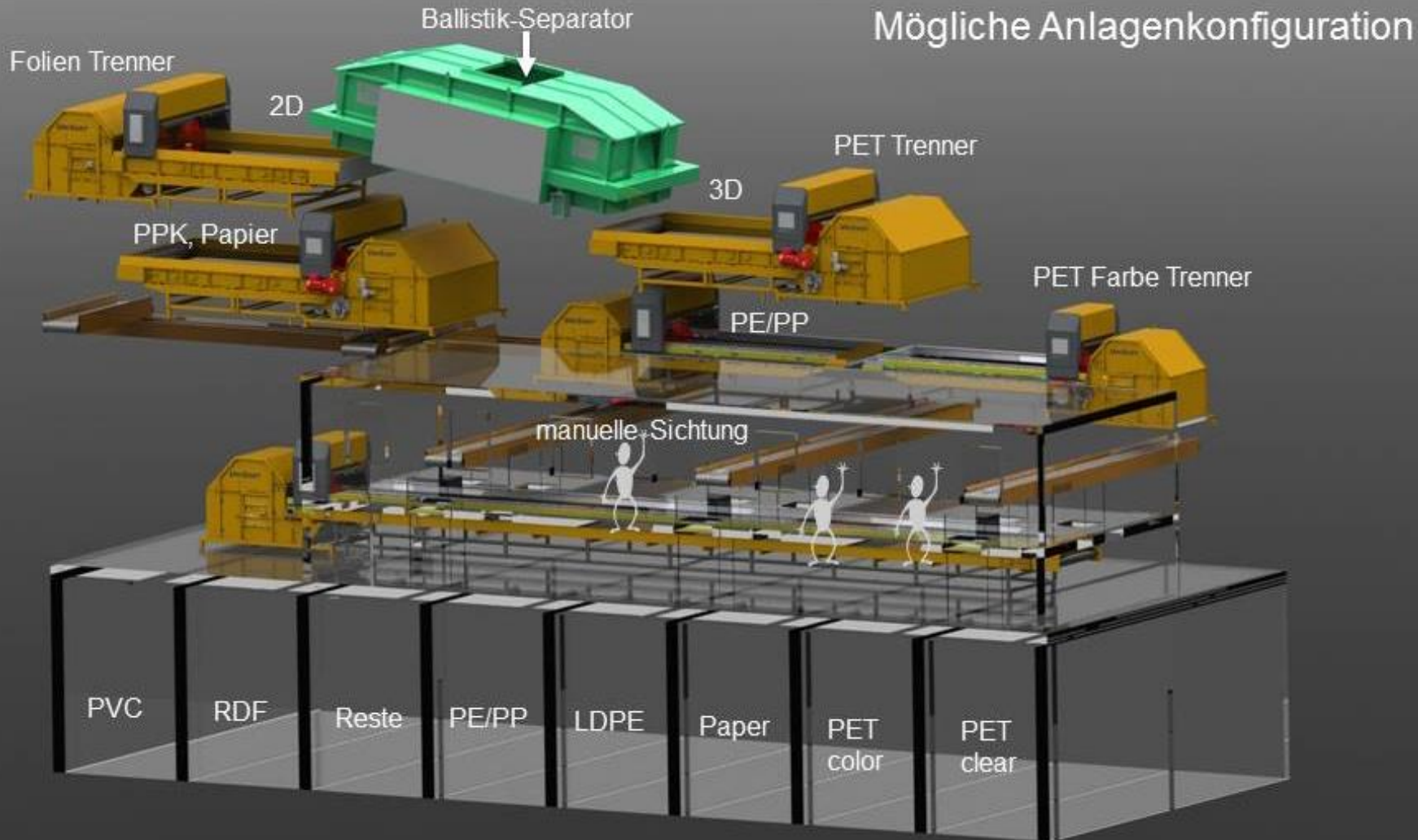
UniSort 96-99 %
competitor 90 %

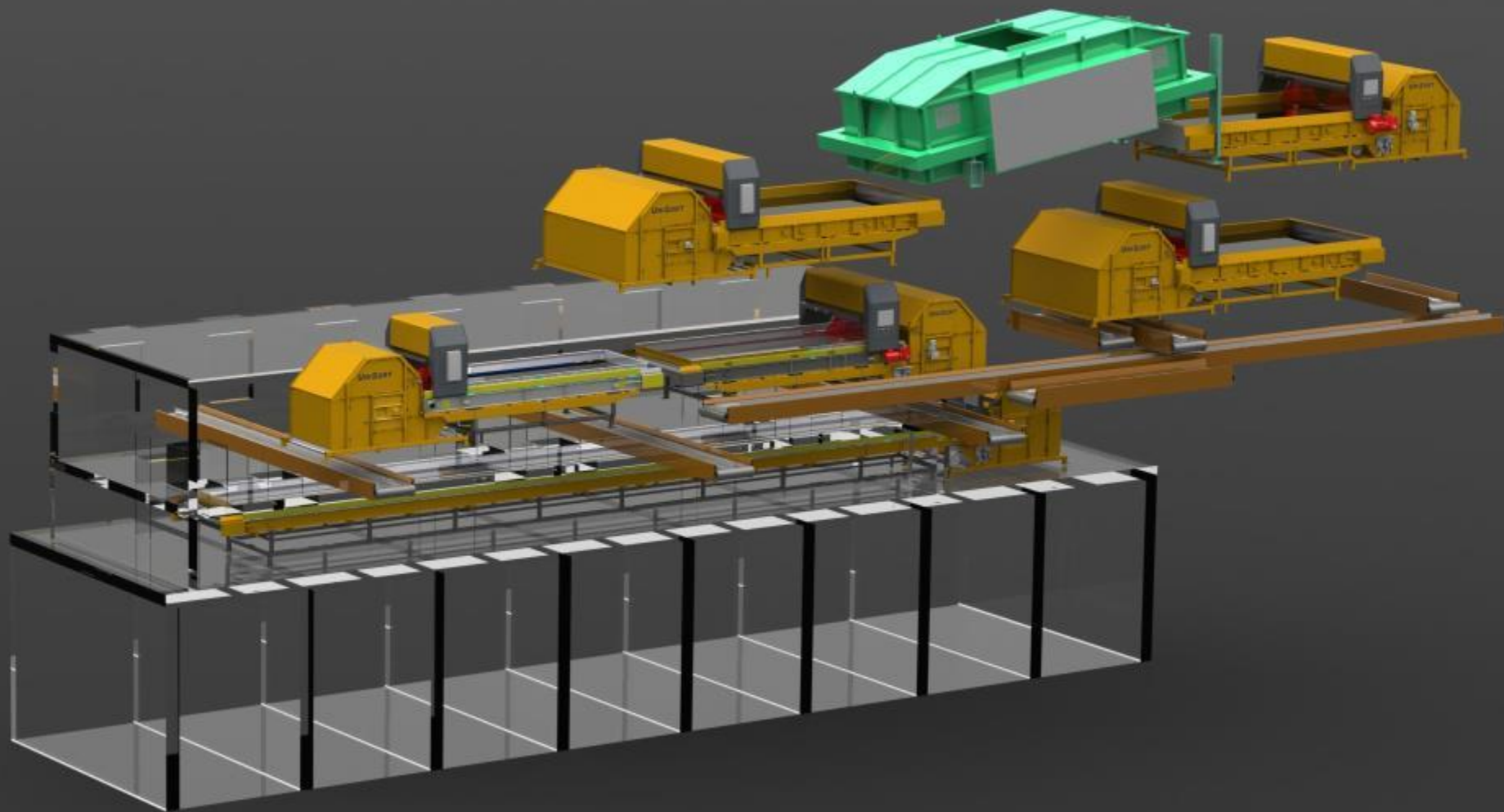
Summary: higher product purity and smaller sorting width

6.1 | possible flow sheet for MBA Plant



6.3 | Possible solution for Slovenia





6.4 | Morphologie 50.000 jato

Materialzusammensetzung				
	Potencial			
Izhodna frakcija –ausgangs Fraktion:	% vom Eingang	2D	3D	Vorsortierung
1	10			
Težka frakcija * (Schwere Fraction)	5,00%			5,00%
Lahka frakcija ** (Leichte Fraction)				
Izgube v procesu (voda, razgradnja ipd.) (Processverluste)	18,00%			18,00%
Fe-kovine (Fe-Metalle)	3,00%			3,00%
Ne-Fe kovine (Al-osnova) (NE-Metalle)	2,00%			2,00%
Papir – mešan (PPK)	24,00%			
papir za deinking (P)	18,00%	18,00%		
lepenka in karton (KK)	6,00%	6,00%		
Papirna OE (lepenka in karton) (Verpackung KK)	9,00%	9,00%		
Steklena OE (Verpackung Glass)	3,00%		3,00%	
Steklo mešano (Glass gemischt)	1,00%		1,00%	
Lesena OE (Verpackung Holz)	0,00%			
Les – mešani (Mischholz)	6,00%		6,00%	
les – naravni (Naturholz)	3,00%			
les – drugo (Restholz)	3,00%			
Mešana plastika (Gemischte Plastik)	27,00%			
PET	10,00%		10,00%	
HD-PE	5,00%		5,00%	
LD-PE	4,00%	4,00%		
PVC	2,00%		2,00%	
EPS	2,00%		2,00%	
PP	1,00%		1,00%	
druge izločene vrste plastike (Andere Plastikmaterialien)	3,00%		3,00%	
Sestavljena OE (Getränkekartonage)	1,00%	1,00%		
Drugo****:				
Nevarni (Gefährliches Abfall)	1,00%			1,00%
		38,00%	33,00%	29,00%

Waste & Recycling
Mixed Plastics Sorting

End



Ernie Beker; RTT Steinert GmbH

www.steinert.de

www.unisort.com

Steinert Group

Germany, September 2013

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