



Plants for the  
comprehensive sorting  
of recyclable materials

# High quality

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#### Delivering on what was promised

The origins of the present day's STADLER Anlagenbau GmbH, headquartered in Altshausen in southern Germany, extend back to the 18th century. The success of the company today is based on a philosophy of value and mutual appreciation, just as it was back then.

As a globally in-demand specialist in the planning, production and assembly of automated sorting plants and machinery for the recycling industry, the company continues to be run as a family business – now in its seventh generation – by Willi Stadler.

STADLER stands for top quality made in Germany, combined with future-oriented engineering expertise, always with a focus on the wishes and requirements of its customers.

Renowned as an international pioneer in plant and machinery construction for the recycling industry, STADLER builds on traditional values. Honesty and trust. Close personal dialogue with customers, as well as suppliers and employees. A genuine handshake mentality. This is what distinguishes STADLER and forms the basis of the company's success – in the past and in the future.



# Trailblazer

## Global waste problem

According to the latest calculations, an additional eight million tons of plastic pollutes our oceans every year. This figure is expected to double by 2030 – and quadruple by 2050.

Halting this development requires recycling loops that work around the world. Essential here is professional sorting by materials and colours on a large scale – with the aim of achieving maximum sorting purity.

This is where plant manufacturers like STADLER are in demand. We can make a valuable contribution to our environment.



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# Comprehensive

## STADLER plants

### Premium machinery construction, made in Germany

Each of our high-performance, extremely efficient large-scale plants is state-of-the-art and precisely tailored to the individual requirements of the respective customer. Our engineers accompany and support you throughout the entire project, to the handover of the keys and beyond.

### Professional expertise in every regard

Be it engineering, steel construction, electrical installation or assembly – with our team of experienced specialists, we are ideally positioned in every respect. For maximum assurance, we put the full plant in advance through its paces in our "STADLER Technical Centre".

### Comprehensive all-round solution

From planning, production and assembly to commissioning – we offer a special form of full service around the world. This also applies to pending maintenance work, and in the event of plant conversion or dismantling.

### Conveyor technology

Thanks to its modular design, our conveyor technology is suitable for every application and all local conditions. The conveyors are available in a range of versions and with different side wall heights and belt widths.

### Trommel screen

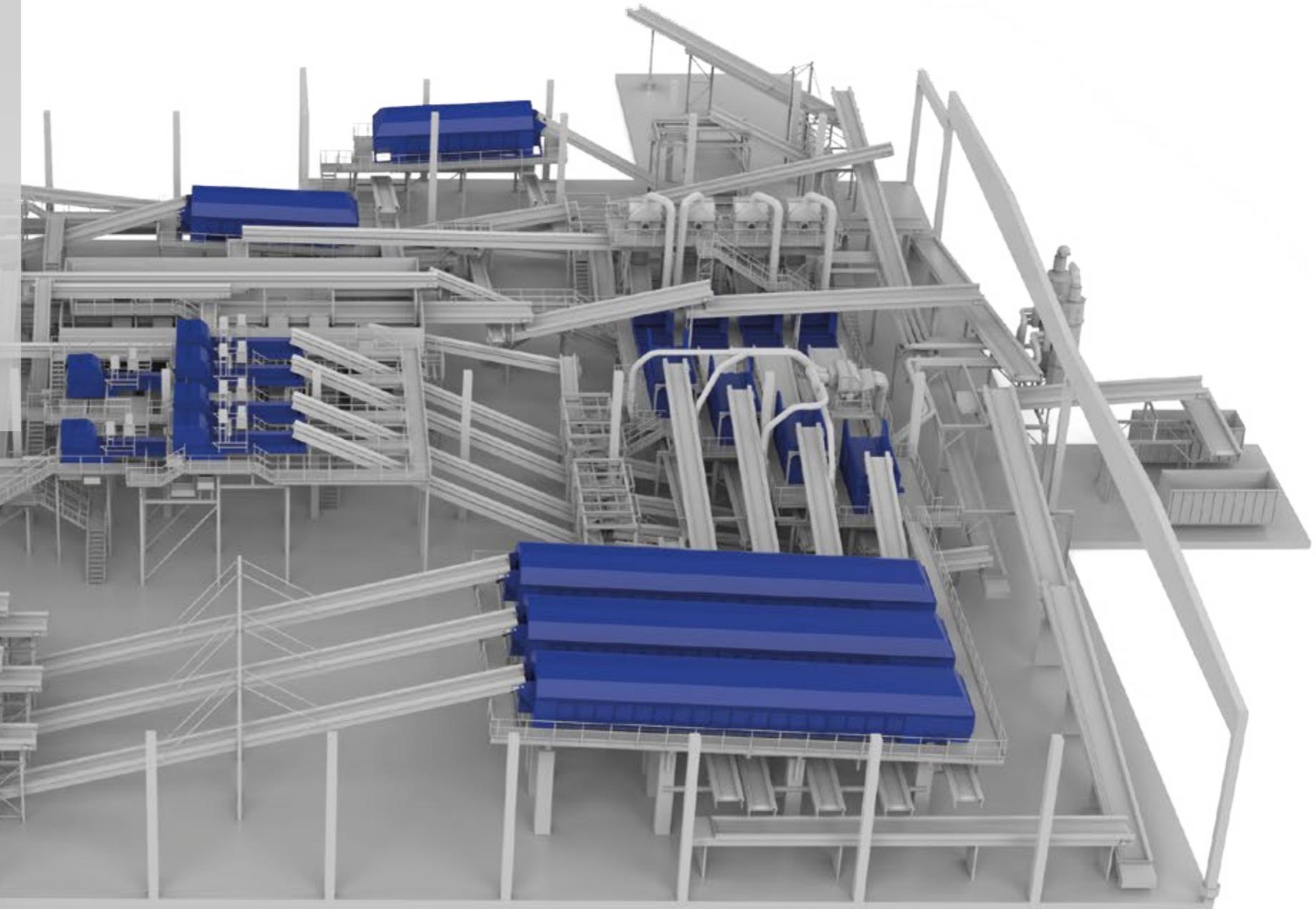
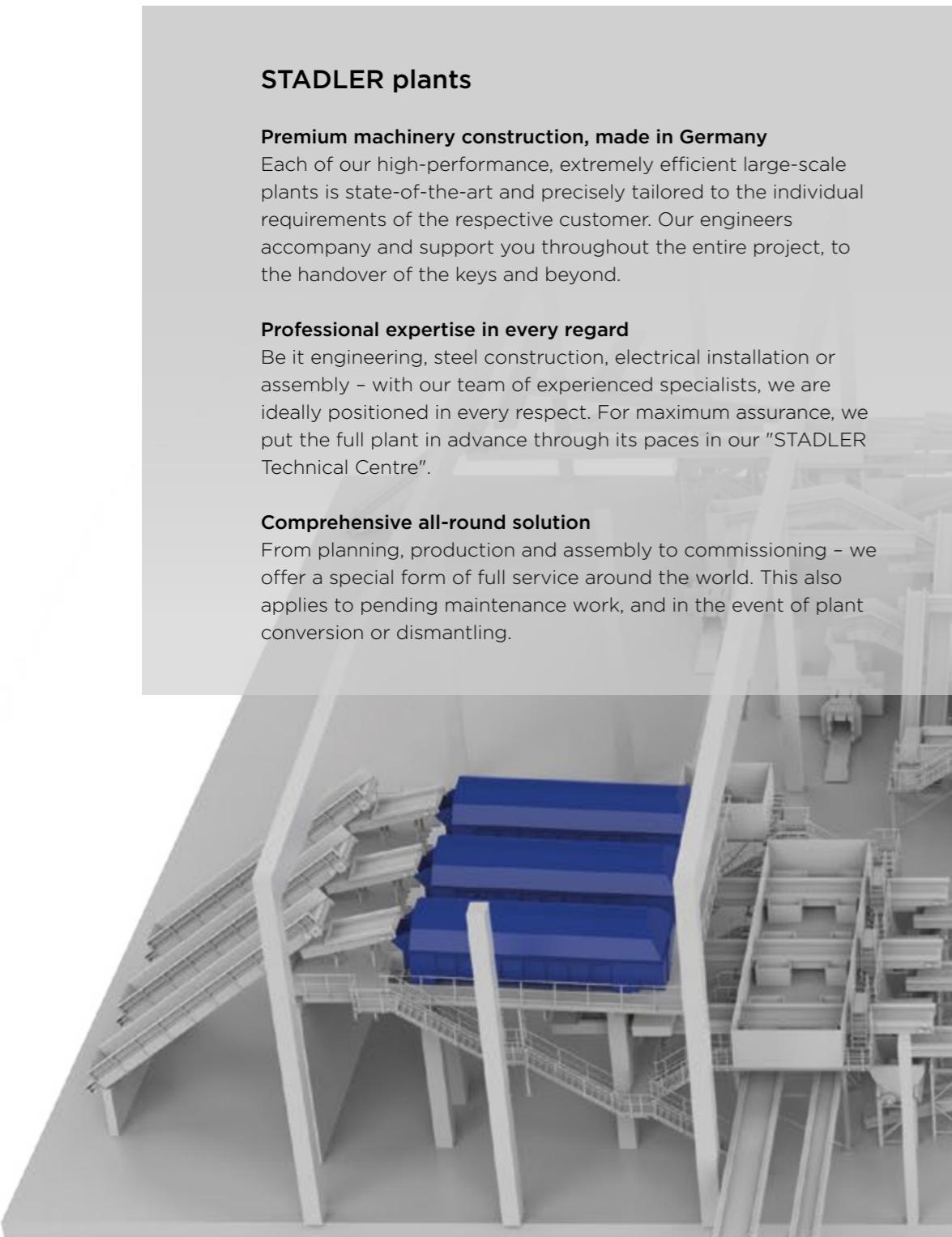
Our robust trommel screens enable you to achieve the reliable break-up of material composites, even distribution of the sorted material, and the best possible classification of your material into different grain sizes.

### Ballistic separator

Our ballistic separators optimally separate your material mixture into individual fractions. The machinery is available in a range of different models and is characterised by a number of exclusive performance features, such as our patented pivoting frame.

### Label remover

Our high-performance label remover processes up to nine tons of PET bottles per hour – with quality that delivers up to 80 percent label removal. It is characterised by a robust overall construction and is highly resistant to contaminants.



# STADLER sorting plants for household waste

STADLER stands for individually planned, turnkey household waste plants with a processing capacity of 40,000 t/year up to high-capacity plants with a capacity of 1,000,000 t/year, such as the one we recently successfully constructed in Spain.



## STADLER experience

*“Thanks to over 60 plants realised around the world to date, STADLER possesses broad expertise and a high level of experience in the field of household waste processing.”*

The world's first fully automatic household waste sorting plant was built by STADLER in Oslo, Norway.

## Material properties

Household waste consists of all types of waste generated in the household. In addition to organic waste such as leftover food, this also includes a wide variety of recyclable materials. This type of diverse material composition with a correspondingly highly varied density of between 100 and 300 kg/m<sup>3</sup> represents a particular challenge for such plants, because it simultaneously demands a high degree of plant flexibility and robustness.

## Example process description for an automated sorting plant for household waste with manual re-sorting:

after infeed dosing, the material is separated into different grain sizes according to shape (flat [2D], rolling [3D], screening) by various screening processes via our trommel screen and ballistic separator machinery. In order to achieve the maximum possible sorting purity, large-area film are separated from the material flows with the aid of windshifters. This significantly improves subsequent sorting using near infrared technology (NIR). In combination with the subsequent magnetic and eddy current process, the desired high output qualities are achieved. Following manual quality controlling, the material is finally separated into fractions, collected in hopper belts and pressed to reduce volume for storage and transport.

**Example process description for a fully automatic household waste sorting plant:** here, the waste is initially uniformly fed into the plant via a feed dosing system. Organic constituents, plastic packaging and cans are separated out by means of screening and NIR processes, as well as magnets. During the next step, we separate the various polymers and Tetrapak elements into different types of plastic using a special optical recognition matrix.

This is followed by the extraction of paper, as well as non-ferrous metals. The organic fraction is stabilised by means of a biological process and processed into high-quality compost material. A further option is to use the organic fraction for alternative power generation in an anaerobic fermentation plant.

Main components	Output fractions
<ul style="list-style-type: none"><li>· Bag opener</li><li>· Heavy-duty infeed hopper</li><li>· Shredder</li><li>· Trommel screen</li><li>· Ballistic separator</li><li>· Windshifter</li><li>· Perforator</li><li>· Near infrared technology NIR</li><li>· Overbelt magnet</li><li>· Eddy current separator</li><li>· Second-stage shredder</li><li>· Sorting cabin</li><li>· Baler</li><li>· Can press</li><li>· Conveyor</li><li>· Steel construction with walkway</li><li>· Electrical engineering</li></ul>	<ul style="list-style-type: none"><li>· Ferrous metal</li><li>· Film</li><li>· Fine grain</li><li>· Mixed plastic</li><li>· Non-ferrous metal</li><li>· Organic</li><li>· Paper/cardboard/paperboard</li><li>· PE</li><li>· PET</li><li>· PP</li><li>· Tetrapak</li></ul>

# STADLER sorting plants for dry mixed recyclables

Although disposal of the material essentially takes place in a similar way, the material properties vary from country to country. The fact that STADLER was involved in developing the first plants of this type from the outset is extremely useful in this regard. STADLER is familiar with each material in the individual countries, and knows which plant model will produce the best overall results for the customer in each individual case.

## Material properties

Nowadays, separation of the organic fraction from recyclable materials takes place in many countries around the world. However, the dry mixed recyclables contain greatly differing components depending on the country.

For STADLER, this means it is necessary to devise the best possible overall plant concept for each type of material.

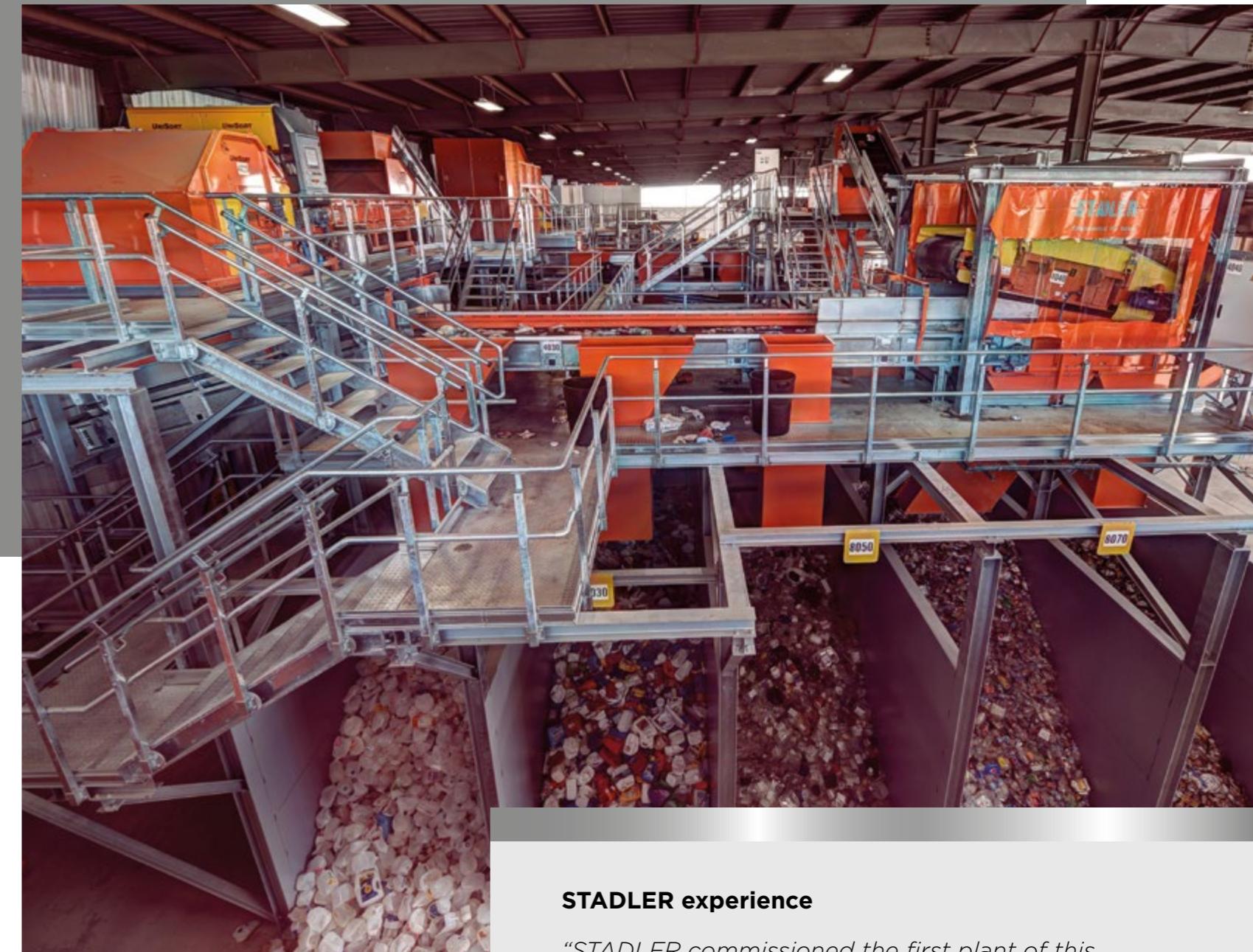
The average composition exhibits an approximate density of 80 kg/m<sup>3</sup>. Since paper and cardboard have by far the highest density in this mixture, the overall density varies depending on the proportion of these two recyclables.

Because the proportion of film and plastic trays in the total volume is constantly increasing, both the composition and total density will change in the future.

## Example process description

After the plastic bags have been mechanically opened, the material is divided into the previously defined grain size and shape using a trommel screen and ballistic separator. Sorting of the individual materials is carried out with the aid of special optical systems.

If required, the fraction purity can be optimised by manual sorting in a sorting cabin. The sorted fractions are pressed into bales for volume reduction and improved handling during transport.



This STADLER plant produces outstanding results when sorting American SINGLE STREAM material.

## STADLER experience

*"STADLER commissioned the first plant of this type back in 2008. Since then, more than 25 such STADLER sorting plants have gone into operation, with installations in France, England and the USA in particular."*

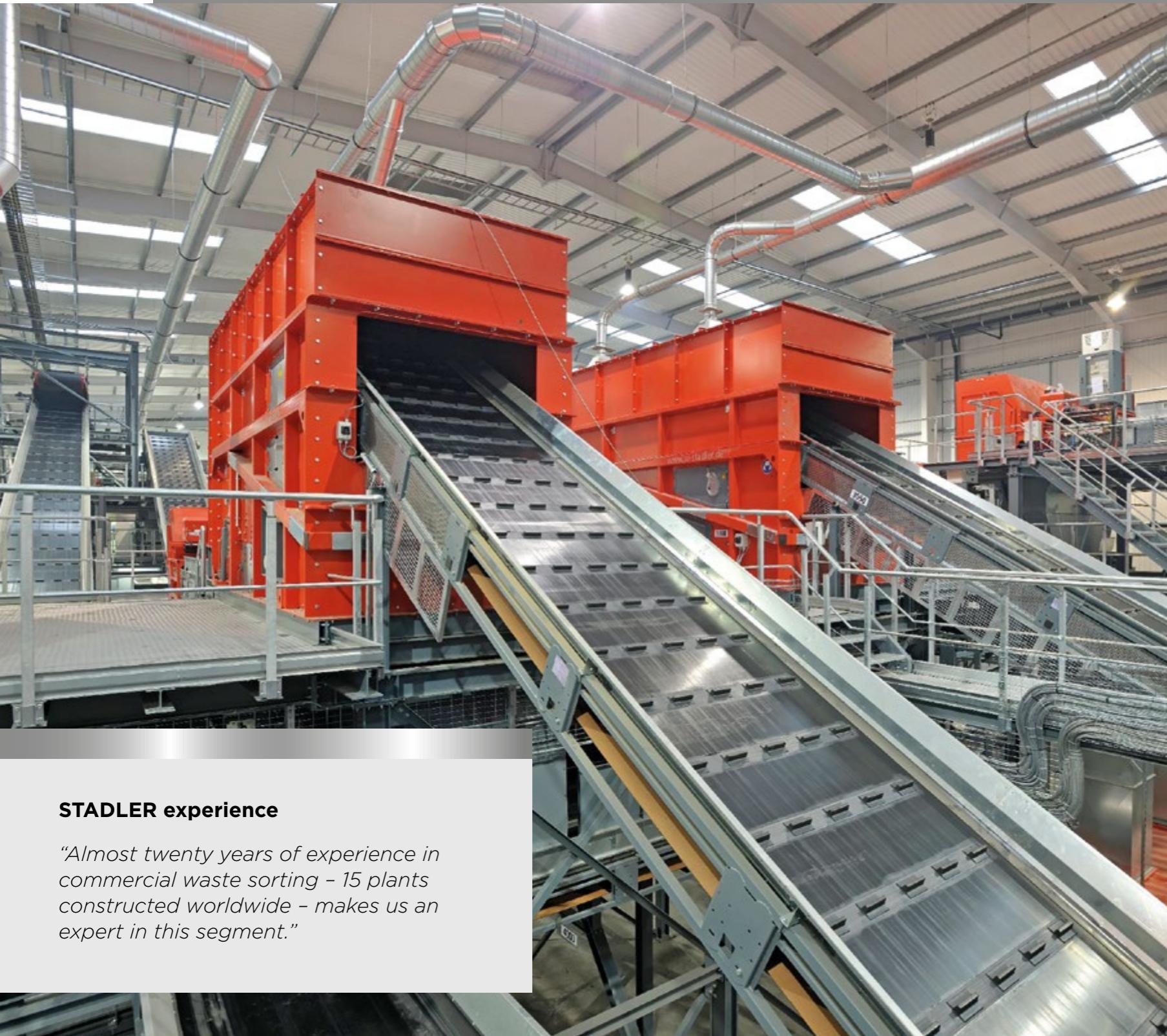
## Main components

- |                                |                          |                   |                                   |
|--------------------------------|--------------------------|-------------------|-----------------------------------|
| · Bag opener                   | · Overbelt magnet        | · Baler           | · Steel construction with walkway |
| · Trommel screen               | · Eddy current separator | · Container press | · Electrical engineering          |
| · Ballistic separator          | · Windshifter            | · Can press       | · Conveyor                        |
| · Near infrared technology NIR | · Sorting cabin          |                   |                                   |

## Output fractions

- |                 |                                      |             |                       |
|-----------------|--------------------------------------|-------------|-----------------------|
| · Ferrous metal | · Non-ferrous metal                  | · PET trays | · Refuse derived fuel |
| · Film          | · Paper/paperboard / cardboard boxes | · PP        | · Small film          |
| · Fine grain    | · PE                                 | · PS        | · Tetrapak            |
| · Mixed plastic | · PET bottles                        |             |                       |

# STADLER sorting plants for commercial waste



## STADLER experience

*“Almost twenty years of experience in commercial waste sorting – 15 plants constructed worldwide – makes us an expert in this segment.”*

Commercial waste consists of a wide range of different products, substances and materials with greatly differing volumes and a rather high density. This means that high demands are placed on the machinery used. This poses no problem, thanks to our extremely high quality standards.

### Material properties

Our commercial waste sorting plants separate all substances or products that are generated in trade and industry. With a density of approx. 150 kg/m<sup>3</sup>, commercial waste exhibits a relatively high weight.

### Example process description

The process starts with material dosing via an infeed hopper or metering drum. Following initial shredding, the material is separated into different grain sizes by a trommel screen, and then into different shapes by ballistic separators (flat [2D], rolling [3D], screening). In addition, large flat film are separated from the material flows by windshifter or trommel separator. This significantly improves subsequent sorting using near infrared technology (NIR).

In combination with the magnetic and eddy current process, the desired high output qualities are achieved. If required, the fraction purity can be optimised through manual sorting. Finally, the separated fractions are collected in hopper belts or boxes and pressed to reduce volume for transport.

Main components	Output fractions
<ul style="list-style-type: none"> <li>· Pre-shredder</li> <li>· Trommel screen</li> <li>· Ballistic separator</li> <li>· Windshifter / trommel separator</li> <li>· Second-stage shredder</li> <li>· Near infrared technology NIR</li> <li>· Overbelt magnet</li> <li>· Eddy current separator</li> <li>· Sorting cabin</li> <li>· Baler</li> <li>· Can press</li> <li>· Conveyor</li> <li>· Steel construction with walkway</li> <li>· Electrical engineering</li> </ul>	<ul style="list-style-type: none"> <li>· Ferrous metal</li> <li>· Film</li> <li>· Mixed plastic</li> <li>· Non-ferrous metal</li> <li>· Paper/paperboard / cardboard boxes</li> <li>· PE</li> <li>· PET</li> <li>· Refuse derived fuel</li> </ul>

STADLER STT5000 ballistic separators are at the core of a commercial waste plant.

# STADLER sorting plants for lightweight packaging

Thanks to our broad wealth of experience, our high-performance plants achieve a high degree of sorting purity – which is particularly vital today, in times of worldwide plastic waste pollution.

## Material properties

Packaging resulting from everyday use is sorted in our sorting plants for light packaging. Such waste consists of various types of plastics / polymers, aluminium, tin plate or composite materials, such as drink cartons.

## Example process description

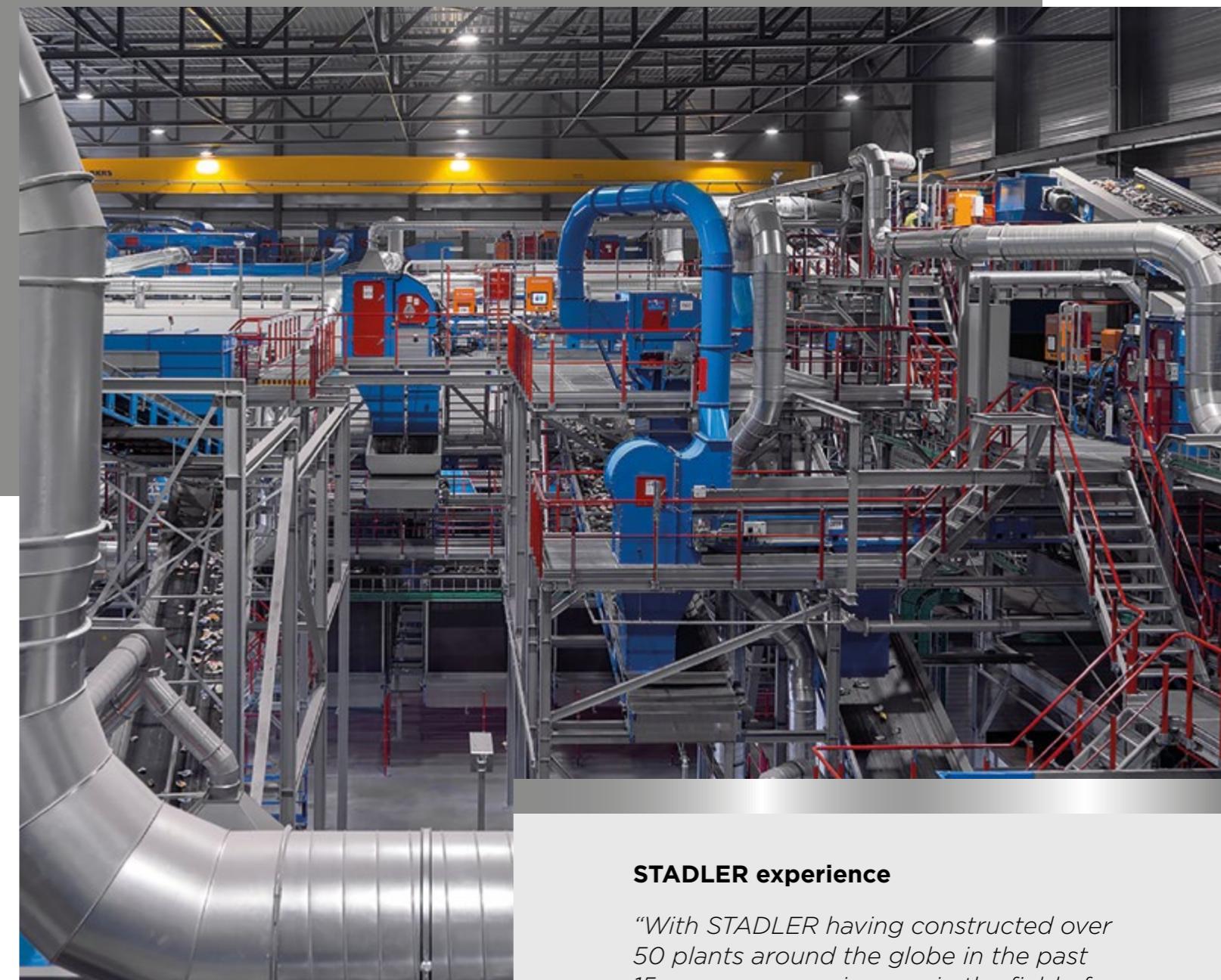
Consumers collect lightweight packaging in plastic bags beforehand. These are therefore initially placed in the bag opener. The materials in the bags are then transported to a trommel screen. Here, they are classified into different grain sizes. The fine fraction is sorted out of the process at this point, due to many non-recyclable impurities.

In the medium fractions, film are sorted out first by means of windshifters. Ferrous metals are then removed by a magnet, and non-ferrous metals are extracted from the material flow by an eddy current separator.

The main stream enters a ballistic separator, where it is sorted according to shape (flat [2D], rolling [3D], screening). The 3D fraction that exits the ballistic separator is fed to several NIR devices, which reliably separate the PET, PP, PE, PS and Tetra materials.

The trommel screen overflow is transported to a windshifter before subsequently entering a sorting cabin for re-sorting.

The sorted fractions are pressed into bales for volume reduction and improved handling during transport.



Example of outstanding lightweight packaging sorting in the Netherlands

## STADLER experience

*"With STADLER having constructed over 50 plants around the globe in the past 15 years, we are pioneers in the field of sorting all types of lightweight packaging."*

## Main components

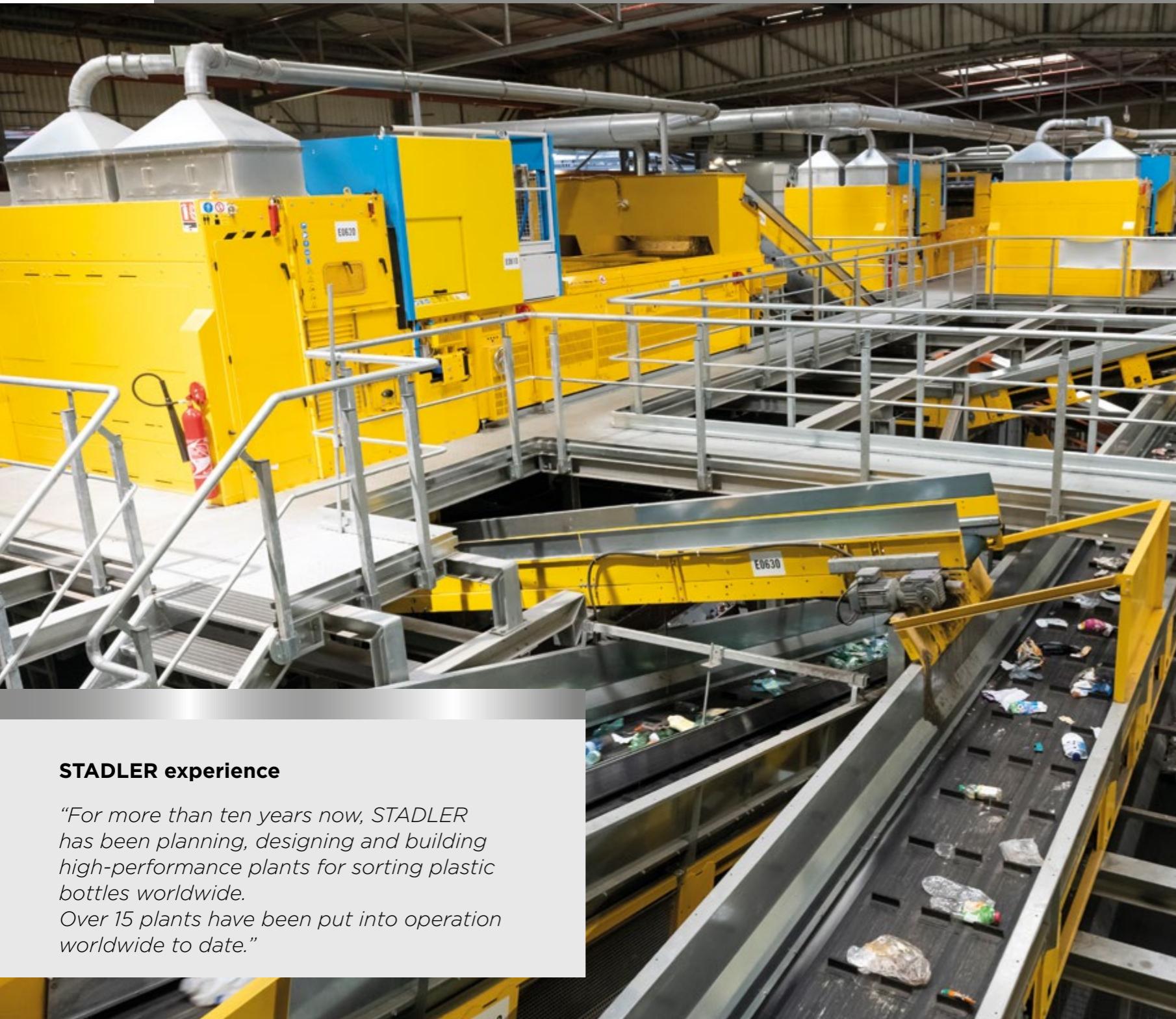
- |                                |                          |                                   |              |
|--------------------------------|--------------------------|-----------------------------------|--------------|
| · Bag opener                   | · Overbelt magnet        | · Baler                           | · Electrical |
| · Trommel screen               | · Eddy current separator | · Container press                 | engineering  |
| · Ballistic separator          | · Windshifter            | · Conveyor                        |              |
| · Near infrared technology NIR | · Sorting cabin          | · Steel construction with walkway |              |

## Output fractions

- |                 |                     |                       |            |
|-----------------|---------------------|-----------------------|------------|
| · Ferrous metal | · Non-ferrous metal | · PP                  | · Tetrapak |
| · Film          | · PE                | · PS                  |            |
| · Fine grain    | · PET bottles       | · Refuse derived fuel |            |
| · Mixed plastic | · PET trays         | · Small film          |            |

# STADLER sorting plants for plastic bottles

One of our areas of expertise is the pre-sorting of bottles for washing plants. Thanks to our extensive experience, we achieve a high degree of purity in the final output fraction, which enables seamless further processing.



## STADLER experience

*"For more than ten years now, STADLER has been planning, designing and building high-performance plants for sorting plastic bottles worldwide. Over 15 plants have been put into operation worldwide to date."*

In this French plant, the bottles are sorted by plastic type before being subsequently recycled.

### Material properties

Pressed mixed plastics and loose mixtures of plastic bottles are processed within the framework of plastic bottle sorting.

### Example process description

Both mixed plastics in bale form and loose plastic bottles are added to the process via separate material infeeds.

Our ballistic separator subsequently separates fine grains and flat material. The remaining three-dimensional material is freed from any impurities (ferrous and non-ferrous metal separation), before being separated into different plastic fractions by means of optical sorting and then pressed.

Thanks to cooperation with Krones AG, we are able to cover the complete recycling loop in the field of plastic bottles. Following sorting and pressing, the material is granulated. The resulting regranulate is mixed with new granulate and melted. Using injection moulding machines, so-called "preforms" are created from this product, which are blown into new PET bottles after a short heating process. These are then cleaned and labelled, filled and sold.

### Main components

- Ballistic separator
- Windshifter
- Shredder
- Near infrared technology NIR
- Overbelt magnet
- Eddy current separator
- Sorting cabin
- Baler
- Conveyor
- Steel construction with walkway
- Electrical engineering

### Output fractions

- Clear PE
- Clear PET
- Coloured PE
- Coloured PET
- Ferrous metal
- Non-ferrous metal
- PE granulate
- PET granulate
- PP
- PS

# STADLER sorting plants for film

The subject of film sorting has only recently become a focus of the recycling industry. STADLER identified the demand – and responded immediately. We were the first plant constructor to develop a corresponding sorting concept, which is specially tailored to the properties of film produced from different polyolefins.

## Material properties

In STADLER film sorting plants, the various polyolefins are differentiated from each other and separated accordingly.

## Example process description

Working in close cooperation with Krones AG, we optimise the entire recycling process in the film sector, both in terms of both sorting quality and throughput.

First of all, the film delivered are fed to a dewiring system. This removes the wires from the bales fully automatically and collects them separately.

After the bales have been broken up, the material flow is screened and then fed to downstream ballistic separators.

The input is then precisely separated by several NIR-sorters according to the different film materials and fed to further processing.

The material is initially ground and then pre-washed to remove the first impurities. At this point, the mass flow can already be separated into colours (e.g. coloured and transparent).

Next comes the hot washing process, for decontaminating the flakes.

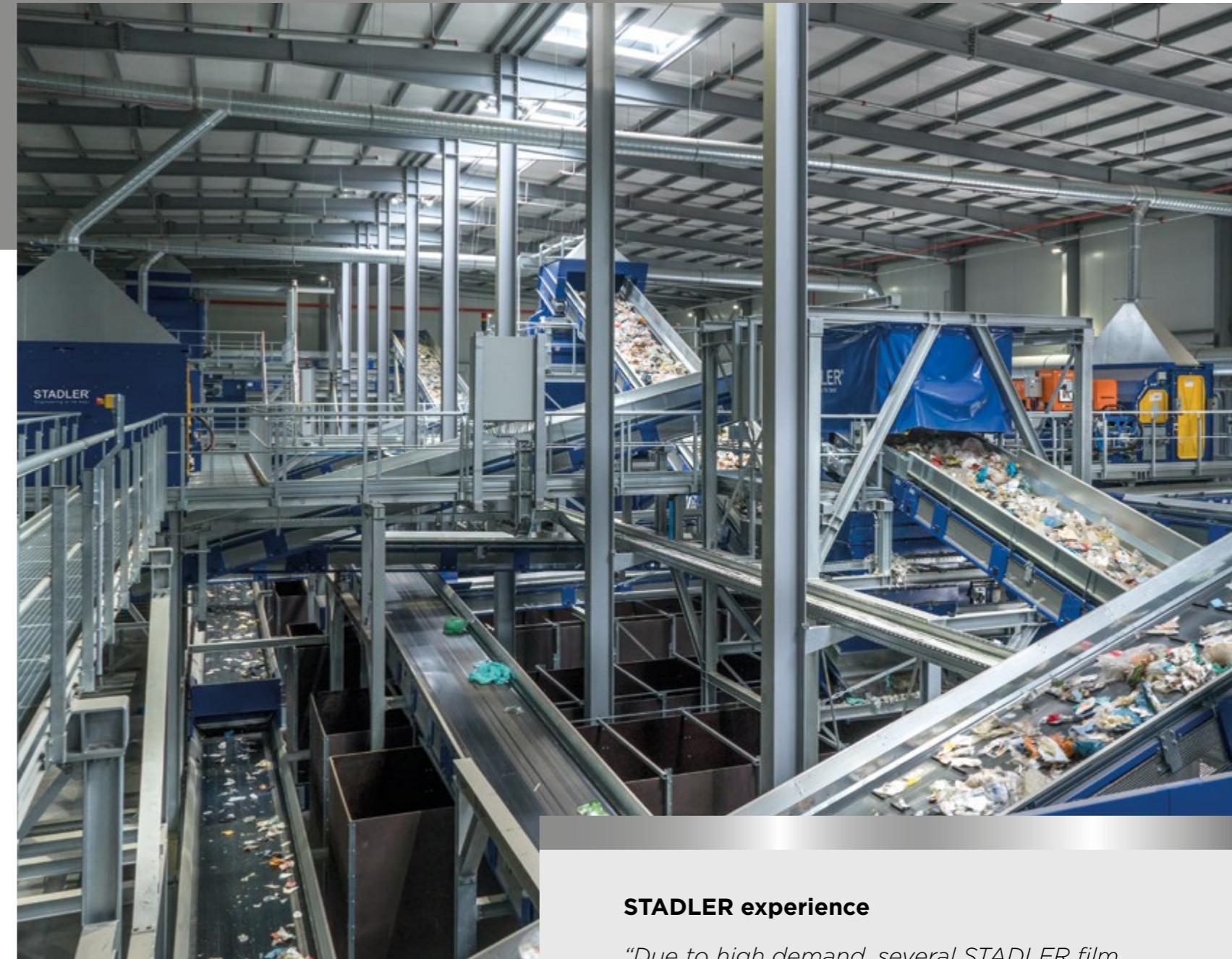
These can pass through a further NIR device for more precise sorting into the desired fraction, in order to achieve a higher degree of purity. The process ends with extrusion and the material is now ready for manufacturing a new product.

## Main components

- |                                      |   |                                   |
|--------------------------------------|---|-----------------------------------|
| · Bale dewiring system / bale opener | · Waste screen /vibration screening machine | · Baler                           |
| · Shredder                           | · Ballistic separator                       | · Conveyor                        |
| · Metering drum                      | · Near infrared technology NIR              | · Steel construction with walkway |
| · Overbelt magnet                    | · Sorting cabin                             | · Electrical engineering          |

## Output fractions

- |                      |             |
|----------------------|-------------|
| · Clear PELD film    | · PEHD film |
| · Coloured PELD film | · PP film   |



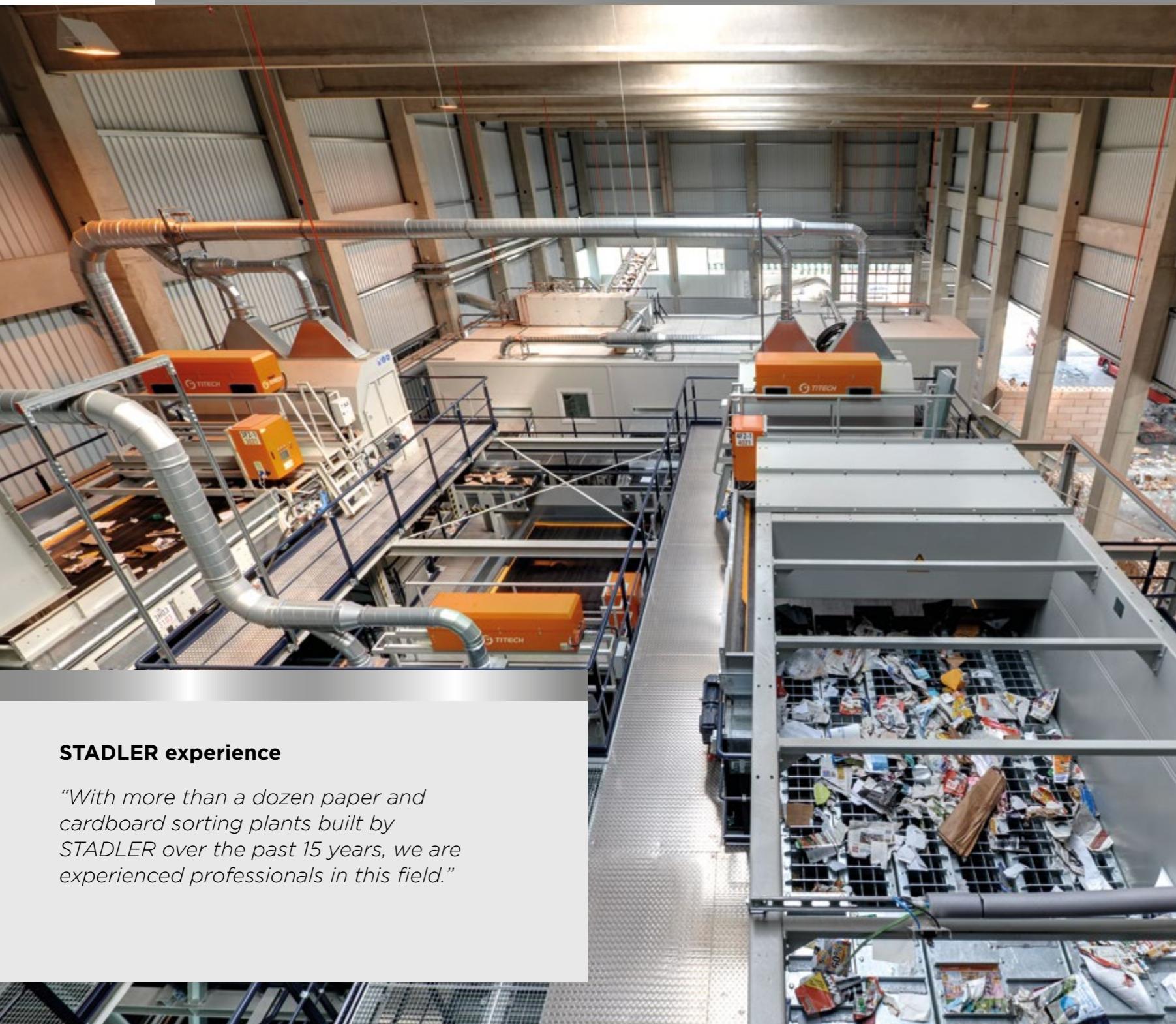
STADLER built the world's first pure film sorting plant with subsequent production of recycled material in Bulgaria.

## STADLER experience

*"Due to high demand, several STADLER film sorting plants are currently in continuous operation in Germany, the Netherlands and Bulgaria."*

# STADLER sorting plants for paper and cardboard

Equipped with our 4-wave ballistic separator PPK, the paper and cardboard sorting plants designed by us are genuine all-rounders. The result is material fractions with the highest degree of purity.



## STADLER experience

*"With more than a dozen paper and cardboard sorting plants built by STADLER over the past 15 years, we are experienced professionals in this field."*

Example of a high quality sorting plant for paper and cardboard in Germany

### Material properties

STADLER paper and cardboard plants are predominantly used for sorting large quantities of waste paper and cardboard from the commercial and municipal sectors.

### Example process description

The paper mixture is fed – continuously metered – to the individual process steps. Ferrous constituents are removed from the overall flow by magnets. Large volumes of cardboard are separated by means of a screen or "paper spike".

The remaining paper mixture is conveyed to the 4-wave ballistic separator PPK, which separates plastic and cardboard particles.

Deinking material that has not been separated is fed – if necessary via further separation steps (NIR) – into the sorting cabin, in which all product streams can be manually re-sorted. Finally, all sorted fractions are compressed by a baler.

### Main components

- Infeed hopper with metering drum
- Overbelt magnet
- Paper spike
- Ballistic separator
- Ballistic separator PPK
- Near infrared technology NIR
- Mechanical sorting machine
- Conveyor
- Sorting cabin
- Baler
- Steel construction with walkway
- Electrical engineering

### Output fractions

- Cardboard boxes
- Deinking
- Mixed paper

# STADLER sorting plants for refuse derived fuel

Refuse derived fuels for cement production must be of consistently high quality. Our plants therefore preferably use mechanical separation processes.

## Material properties

Our refuse derived fuel plants professionally process commercial waste as well as pre-sorted waste containing plastics, which serve to produce high-quality refuse derived fuels for cement production.

## Example process description

In order to deliver high-quality refuse derived fuel for cement production, the material undergoes a complex treatment process. Pre-shredding, screening technology, ballistic separation, NIR and X-ray technology, ferrous and non-ferrous metal separators all serve to separate valuable materials and impurities. The high-quality refuse derived fuel is then re-shredded to the final size required by the cement manufacturer. This is subsequently transferred directly to the feeding system of the cement kiln.

In order to supply the requisite quantities of refuse derived fuel for cement production at all times, we have integrated a spacious intermediate hopper with a powerful automatic crane into the system.

Main components
<ul style="list-style-type: none"> <li>· Pre-shredder</li> <li>· Vibrating screen, roller screen, tensioning shaft screen</li> <li>· Ballistic separator</li> <li>· Windshifter</li> <li>· X-ray technology</li> <li>· Near infrared technology NIR</li> <li>· Overbelt magnet</li> <li>· Eddy current separator</li> <li>· Second-stage shredder</li> <li>· Sorting cabin</li> <li>· Intermediate hopper with automatic crane</li> <li>· Conveyor</li> <li>· Steel construction with walkway</li> <li>· Electrical engineering</li> </ul>

Output fractions
<ul style="list-style-type: none"> <li>· Ferrous metal</li> <li>· Fine goods</li> <li>· Heavy goods (e.g. inert)</li> <li>· Non-ferrous metal</li> <li>· Refuse derived fuel for cement production</li> </ul>



Production of refuse derived fuel in Brazil

## STADLER experience

*"From the first plant in 2005 to date, we have commissioned ten refuse derived fuel plants. According to our customers, each of the plants has more than satisfied expectations."*

# STADLER sorting plants for electrical and electronic waste

Sorting plants for electrical and electronic waste are required to satisfy the highest demands: in addition to separating different types of metal, it is also necessary to detach the metals from valuable plastic sheaths and coatings, and subsequently feed them into the recycling loop.



## STADLER experience

*"Working in cooperation with weeeSwiss Technology AG (which has been active in the field of electronic and electrical waste for over 25 years now), STADLER develops high-quality sorting plants for electrical waste which are unrivalled in terms of sorting quality and throughput."*



With our comprehensive sorting expertise, we really get the ambitious electrical and electronic waste recycling sector moving

### Material properties

The material mix in the field of electronic and electrical waste includes a wide variety of electronic devices of all sizes. Be it mobile phones, computers, printers, televisions or blenders, refrigerators and air conditioning systems.

### Example process description

All electronic and electrical equipment is first dismantled and then shredded. This is followed by mechanical sorting in several stages, during which plastics and the fine fraction are separated from each other. Separation into different plastic and metal fractions then takes place. The pure fractions are finally pressed and sold on to steelworks, smelters and plastics recyclers.

### Main components

- Heavy-duty infeed hopper
- Pre-shredder
- Trommel screen
- Ballistic separator
- Overbelt magnet
- Eddy current separator
- Sensor technology
- Air separator
- Windshifter
- Sorting cabin
- Conveyor
- Steel construction with walkway
- Electrical engineering

### Output fractions

- ABS/PS/PE/PP
- Ferrous metal
- Fine grain containing precious metals
- Mixed plastic
- Non-ferrous metal (aluminium, copper, brass)

# STADLER sorting plants for mixed construction materials and bulky waste

The large-volume material mix with a particularly high density requires an especially robust plant construction with high-performance components. In order to satisfy these requirements, STADLER has developed a true powerhouse – the ballistic separator STT6000 – specifically for this type of plant.

## Material properties

The material mix of construction materials or bulky waste consists of cardboard, wood, ferrous metals, minerals and film. It exhibits a density of approximately 250 to 350 kg/m<sup>3</sup>.

## Example process description

All processes are constantly changing and are supplemented and refined by new technologies – such as the improvement of NIR technology or the use of sorting robots for example.

STADLER always endeavours to deliver the latest technology to the customer. Our ballistic separator STT6000 is particularly well-suited for construction waste and bulky waste, and allows material feeding of very large as well as non-shredded parts. Thanks to its performance capability, the STT6000 is often used at the start of the line. An infeed hopper doses the material, which is then separated by ballistic separators (either pre-shredded or as a whole) into different grain sizes and shapes over the course of several stages, in order to achieve the desired sorting purity during the subsequent optical recognition. Manual or robotic re-sorting then takes place depending on the requirements.

## Main components

- Pre-shredder
- Ballistic separator STT5000
- Ballistic separator STT6000
- Windshifter
- Overbelt magnet
- Eddy current separator
- Near infrared technology NIR
- Sorting robot
- Sorting cabin
- Conveyor
- Steel construction with walkway
- Electrical engineering

## Output fractions

- Cardboard boxes
- Ferrous metal
- Metal
- Minerals
- Non-ferrous metal
- PET/PE
- Refuse derived fuel
- Wood



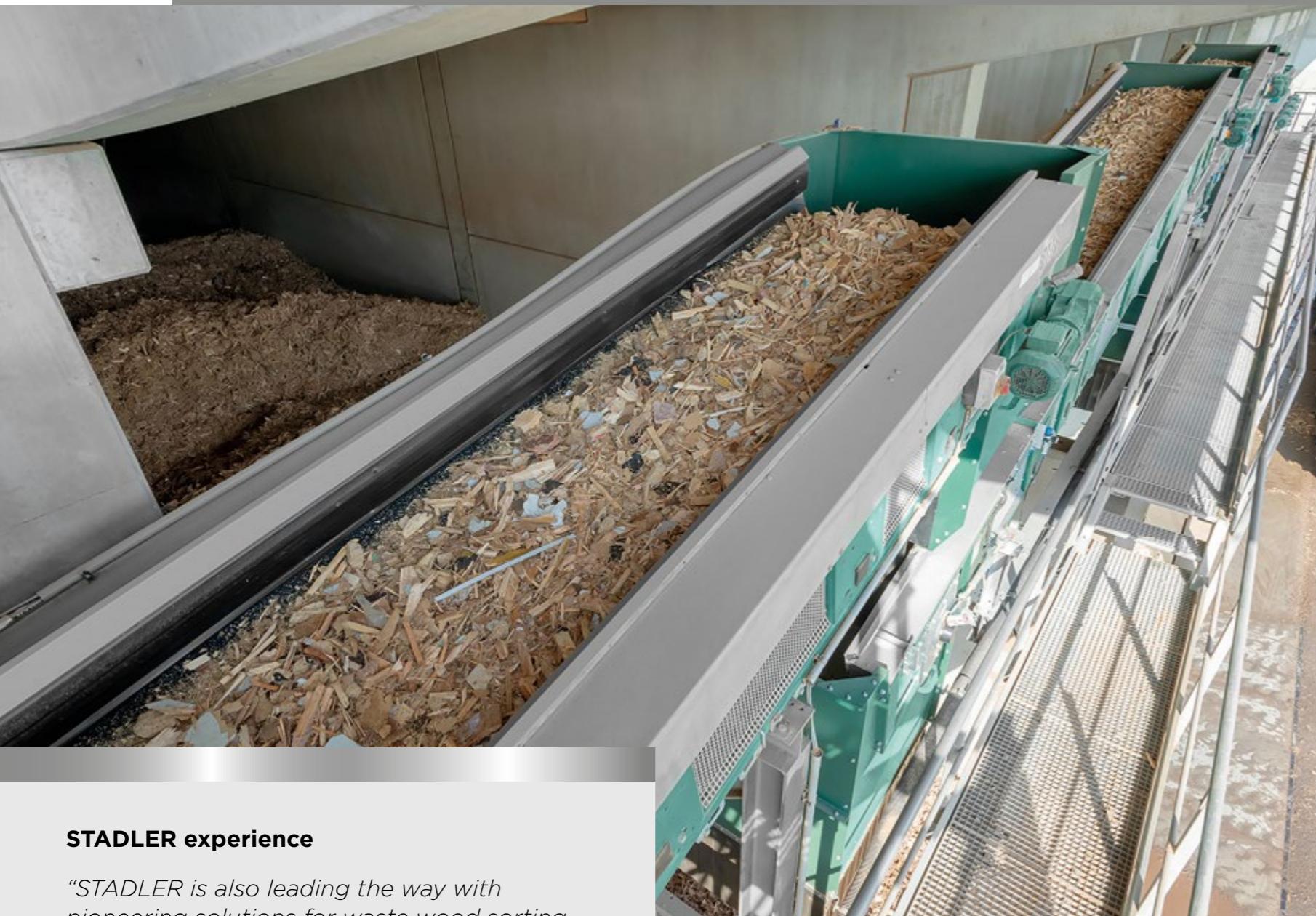
Thanks to our ballistic separator STT6000, even large and heavy objects can be separated into flat and rolling fractions without difficulty.

## STADLER experience

*“Be it construction waste or bulky waste sorting plants, this model example of a young and upcoming class clearly shows how STADLER is keeping up with the times – or is already ahead of them.”*

# STADLER sorting plants for waste wood

STADLER developed high-throughput wood sorting plants to facilitate recycling as much waste wood as possible – the first of several plants to be installed in 2012. The objective: to separate all materials that pose a problem to processing.



## STADLER experience

*"STADLER is also leading the way with pioneering solutions for waste wood sorting plants. The objective: the maximum possible purity, as is the norm with STADLER."*

Wood sorting made in Germany  
- STADLER sorting plants for waste wood open up entirely new prospects.

### Material properties

The input materials of these STADLER sorting plants comprise all types of waste wood, which contain iron elements such as bolts, nails and fasteners, as well as glass or other impurities.

### Example process description

To make sure that sorting of the various impurities is as effective as possible, following infeed the wood is mechanically shredded.

An overbelt magnet and an eddy current separator ensure reliable separation of the ferrous and non-ferrous metals from the rest of the material flow.

Both the metal fractions and the wood fractions separated into different classes are fed into the hoppers or boxes provided for this purpose by STADLER conveyors. Thanks to the high degree of purity in each case, all fractions can be subsequently recycled without difficulty.

### Main components

- Shredder
- Overbelt magnet
- Eddy current separator
- Near infrared technology NIR
- Separation table
- X-ray technology
- Sorting cabin
- Conveyor
- Steel construction with walkway
- Electrical engineering

### Output fractions

- Ferrous metal
- Glass
- Non-ferrous metal
- Various classes of wood

# STADLER perspectives



We at STADLER are hard at work on new, future-orientated technical developments, so that we can help to tackle the constantly growing mountain of waste around the globe.

And in our customary premium quality – made in Germany. In the interests of our customers. In the interests of nature. And in the interests of our corporate philosophy:

Values, worth, appreciation.

Yours, Willi Stadler



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