

LINDNER
WASHTECH



**ALL-IN-ONE SOLUTIONS
PLASTICS RECYCLING**

**CLEAN
PERFORMANCE.**

ONLY LINDNER CLIENTS CAN TRULY SAY:

**FROM
END-OF-LIFE
TO NEW LIFE
MATERIALS.**



Hauke Grabau
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AST Kunststoffverarbeitung GmbH
Germany

#WASTETRANSFORMER

MAKE THE MOST OF WASTE.

LINDNER

INDIVIDUAL AND COMPLETE SOLUTIONS FOR THE PLASTICS RECYCLING OF TOMORROW.

We believe in transforming waste into precious material. That's why we invest all our knowledge and innovative power in shredding and system solutions that are highly efficient, robust, reliable and easy to maintain. So our clients can transform waste into a valuable and reusable resource – efficiently and reliably.



In-house research and development



Production on state-of-the-art machines, using the latest robotics & automation technology



In-house electrical engineering department



Consulting, engineering & system construction



Worldwide service network

INNOVATION AS A PRINCIPLE – QUALITY PROMISED AND DELIVERED

Founded in 1948 in Spittal an der Drau, Austria, the Lindner Group is a pioneer in the recycling industry. Even after 75 years the company is still family-owned, employs over 500 people at 8 sites worldwide and exports to more than 90 countries. At its production sites in Austria, Lindner develops and manufactures complete systems and shredding machines for municipal solid, commercial and industrial waste, waste wood, paper, light scrap, plastics and packaging. State-of-the-art robotics and automation technology ensure a high degree of in-house production, guaranteeing Lindner's trusted quality and the rapid availability of machines, systems and spare parts.

Lindner Waschtech GmbH, a subsidiary of Lindner and part of the Erema Group, has shaped the landscape of plastics recycling for more than a decade. The globally operating company develops, supplies and installs washing systems to recycle contaminated post-consumer plastics of various types including films (LDPE, LLDPE), rigid plastics (HDPE, PP), bottles (PET) as well as specialised applications such as big bags. Lindner Waschtech offers turnkey solutions that incorporate modular washing systems, shredding and sorting technology, and water treatment. A large network of partners and an international team of service and sales professionals ensure a local presence and extensive range of on-site services.



MAXIMUM VERSATILITY.

PLASTICS – A HIGHLY SOUGHT-AFTER RAW MATERIAL

FROM SUPERMARKETS TO SPACE TRAVEL

Due to plastics' countless applications, we encounter them in virtually every aspect of our daily lives. Worldwide production reached 367 million tonnes in 2020 and is rising every day. Polyethylene and polypropylene account for the largest share in terms of volume. The good news: with the right technology, discarded plastics can be transformed back into secondary raw materials, saving precious resources at a profit.

19.7 % PP

Containers, food packaging, tubes, closures, toys, car parts, garden furniture etc.

17.4 % LDPE & LLDPE

Consumer, industrial and agricultural films, Food packaging etc.

12.9 % HDPE, MDPE

Toys, milk bottles, Household goods, pipes, cosmetic bottles etc.

8.4 % PET

Beverage bottles, trays, foils, textile fibres etc.

10.7 % OTHER THERMOPLASTICS

9.6 % PVC

Window profiles, floor coverings, cables, toys, hoses etc.

7.8 % PUR

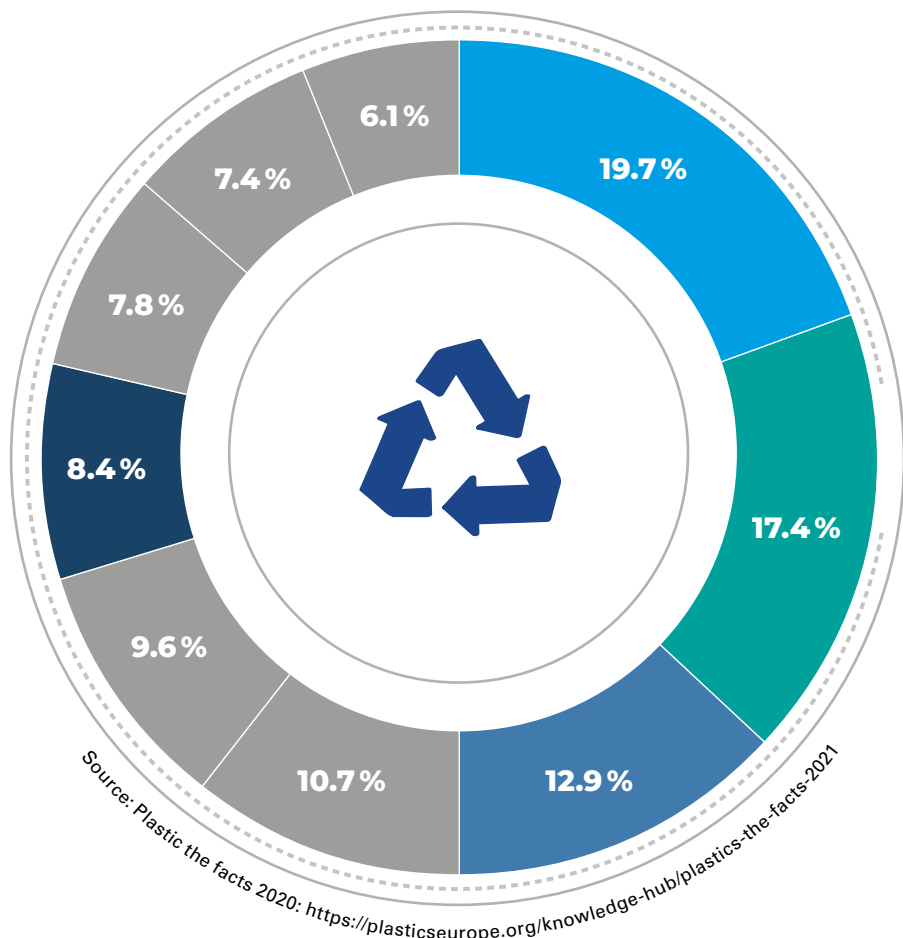
Insulation material, pillows, mattresses etc.

7.4 % OTHER PLASTICS

Insulation material, pillows, mattresses etc.

6.1 % PS, PS-E

Spectacle frames, cups, packing, insulation material etc.



Source: Plastic the facts 2020: <https://plasticseurope.org/knowledge-hub/plastics-the-facts-2021>

LDPE & LLDPE FILM



Large quantities of film are part of the waste stream as post-consumer, post-commercial or agricultural film. Depending on their origins they can be contaminated with organic waste or paper labels. Thanks to modern multi-stage processing and state-of-the-art washing technology, it's possible to produce optimally customised flakes that are perfect for extrusion.

HDPE BOTTLES & CONTAINERS



Bottles and containers are traded in pre-sorted and pressed form. The purity of these materials varies greatly depending on their origin. Lindner's hot-wash system can be used to produce such a high-quality regrind that it can even replace virgin HDPE – the basis of a genuine circular economy.

PP PACKAGING & RIGID PLASTICS



PP waste is generated as mono or mixed fractions while sorting commercial, domestic or bulky waste. The robust shredder, which is resistant to non-shreddables, reliably shreds these materials into sortable flakes. These are then mostly separated by colour, and subsequently cleaned to obtain a homogeneous source material for new, high-quality goods.

PET BOTTLES & TRAYS

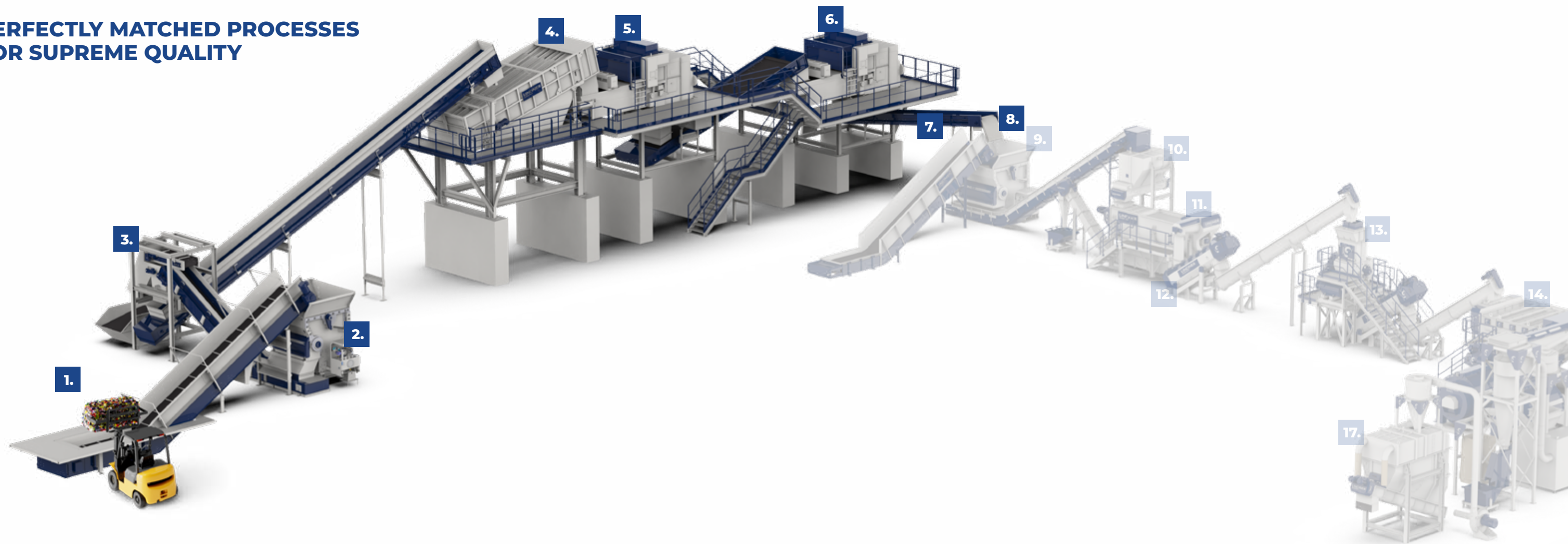


Along with polyolefins, PET is one of the most commonly used packaging plastics. To ensure that PET can be successfully recycled and reused in the food industry, the main focus is on the extensive sorting and demanding cleaning processes. A bottle can then become a bottle again (bottle to bottle) or be used as a raw material for the textile industry.

THE CYCLE STARTS HERE.

PERFECTLY MATCHED PROCESSES FOR SUPREME QUALITY

Quality right from the start. Optimum sorting is an important part of a plastics recycling facility – the higher the sorting quality and the purity achieved, the better the final output granulate. At the beginning of the process chain, the Lindner shredder opens the bales. Specially optimised for the downstream NIR sorting system, the throughput is uniform and has few fine particles. Thanks to NIR sorting devices as well as various processing stages and additional units such as metal separators and screening technology, it's possible to transform waste streams into pure quality, which is then fed into downstream plastic washing systems.



1. MATERIAL FEEDING

2. FIRST SHREDDING STEP –
OPENING THE BALES

3. FERROUS METAL SEPARATION

4. CLASSIFICATION – FINE PARTICLES
SEPARATION AND SEPARATION OF
FOREIGN MATERIALS

5. NIR SORTING I

6. NIR SORTING II

7. WASHING LINE FEED

8. OUTPUT SORTING,
INPUT WASHING LINE



SUCCESS ALL ALONG THE LINE.

EFFICIENT ALL-IN-ONE SOLUTIONS
FOR PLASTICS RECYCLING

Lindner's multi-stage washing lines are in a class of their own. Perfectly matched components ensure superb output quality. Robust high-tech shredding, washing and drying processes are the key to a smooth 24/7 operation with low maintenance requirements and consistently high throughputs. It has never been easier to guarantee the ideal input for subsequent processes. Based on this standard solution, Lindner's washing facilities are individually adapted to the respective requirements. The additional installation of a hot-wash unit ensures that the output material meets the highest quality specifications.



9. SHREDDING

10. DOSING SILO

11. PRE-WASH

12. FRICTION WASH

13. WET GRANULATOR

14. DENSITY SEPARATION

15. PRE-DRYING

16. MECHANICAL DRYING

17. THERMAL DRYING

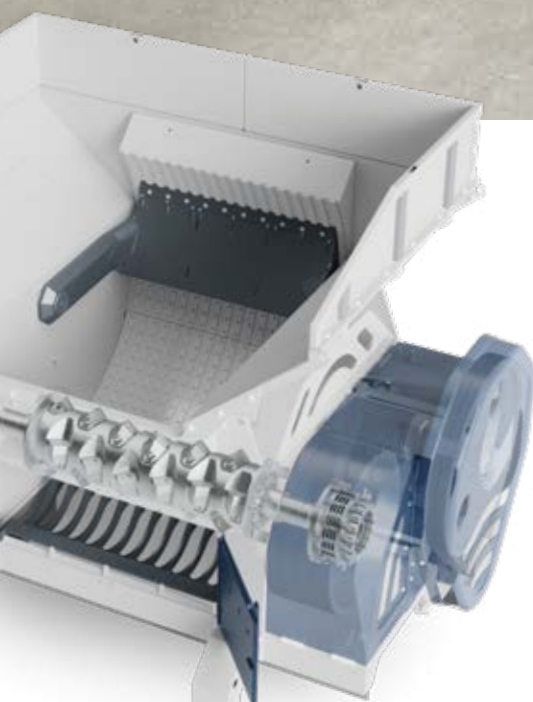
18. QUALITY CONTROL

19. STORAGE SILO



PACKAGING REINVENTED.

POST-CONSUMER PLASTICS PROCESSING



FROM OLD TO NEW

There are a number of things to consider when recycling post-consumer films. Among the biggest challenges are surely the purity and degree of contamination. To overcome these, the films are coarsely shredded in the first process step and ferrous metals and minerals are eliminated before these – depending on the degree of contamination – are washed and dried repeatedly and then turned into high-quality plastic flakes.

APPLICATION NOTE:

Sorting	Jupiter BW
Shredding	Micromat, granulator
Washing components	pre-wash, friction wash, optional hot wash
Drying	mechanical and thermal drying
Material	LDPE, post-consumer film
Throughput	up to 3 t/h
Further use	extruder, granulate production



OUTPUT

THE CLEAN GUARANTEE.

POST-COMMERCIAL RIGID PLASTICS PROCESSING

"In Lindner, we found a partner who used their expertise to design exactly what we wanted – a facility finely tuned to our requirements. We would definitely choose a Lindner facility again!"

Hauke Grabau
Senior Associate Recycling
AST Kunststoffverarbeitung GmbH
Germany



CLOSING THE LOOP

When processing HDPE hazardous goods containers it's particularly important that the individual process steps are perfectly matched and flexible – especially if these are to be used again in the hazardous goods industry in line with the circular economy principle. In addition to the constant shredding process, the various washing steps are important. Particularly heavily contaminated containers and drums are cleaned with Lindner's "hot-wash system", which can be switched on and off as needed depending on the contamination and required quality.

APPLICATION NOTE:

Shredding	Antares or Micromat, granulator
Washing components	pre-wash, friction wash, optional hot wash
Drying	mechanical and thermal drying
Material	HDPE
Throughput	up to 5 t/h
Further use	extruder, granulate production



A CLEAN PROCESS.

PROCESSING OF POST-CONSUMER
PET BOTTLES



BOTTLE TO BOTTLE

Turning old into new – is probably one of the most challenging tasks in plastics recycling, especially when the rPet granulate has to meet the food industry's standards. After extensive, repeat sorting only recyclable material is passed on to the washing process. The focus is on the multiple washing processes, cold as well as hot, with and without caustic solution, to clean the potential raw material and remove labels and other contamination. However, gentle drying and an early elimination of HDPE and PP materials are equally important for a high output quality and purity.

APPLICATION NOTE:

Bale opening Shredding	Antares, Micromat granulator
Washing components	pre-wash, friction wash, hot wash – with and without caustic solution
Drying	mechanical and thermal drying
Material	PET
Throughput	up to 6 t/h
Further use	extruder, granulate production



OUTPUT

SHREDDING & GRANULATING



MICROMAT SERIES

Cutting system: Single-shaft shredder with different rotor systems e.g. the universal Mono Fix system and the lightning-fast safety clutch; defined particle sizes thanks to round-hole or hexagonal screens

Drive: Optional powerful gear drive with mighty and tried-and-tested motors or as direct belt drive (HP) for maximum output

Particle sizes: 15 – 250 mm



JUPITER SERIES

Cutting system: Single-shaft system with screwed pointed knives, two stator knife rows and defined particle sizes thanks to sickle-shaped or hexagonal screens

Drive: Electromechanical, countershaft belt drive and additional flywheel energy storage for particularly tough materials. New BW series – ideal for downstream NIR sorting systems.

Particle sizes: 100 – 300 mm



KOMET SERIES

Cutting system: Single-shaft system with screwed knife rows, two stator knife rows and defined particle sizes thanks to round-hole or hexagonal screens

Drive: Electromechanical belt drive. Optional: high-performance (HP) version with an even more powerful drive and additional rows of knives

Particle sizes: 10 – 90 mm



THE RIGHT SOLUTION.

WASHING & DRYING



WET-GRANULATOR

Robust wet granulator for fine grinding

- Five different sizes with throughputs up to 3,000 kg/h
- Special rotor variants for films or rigid plastics



RAFTER

Efficient pre-washer for heavily contaminated, primary shredded plastics

- Three different cleaning zones to separate contaminants and impurities
- Slow speed to ensure a gentle process low in wear and tear



TWISTER

Friction washing to remove even the smallest dirt particles

- Various sizes with throughputs up to 5,000 kg/h
- Robust and maintenance-friendly design
- Stainless steel machine housing
- Changeable rotor paddles and screens



HOT-WASH

Hot-wash system to remove stubborn adhesions and odours

- Washing temperature between 50°C and 85°C
- Particularly reliable due to dosed friction and defined material dwell time
- Optional operation with water or caustic solution
- Operation with separate water cycle



LOOP-DRYER

Mechanical drying and removal of material adhesions

- Use of controlled centrifugal force at approx. 600-1,000 rpm
- Different rotor versions (ø 1,000, 1,200, 1,500, 2,000 mm)
- Paddles changeable & individually adjustable



STEP-DRYER

Gentle drying of brittle and sensitive plastics

- Gentle drying in 5 screen segments at increasing speed
- Minimised material losses
- High energy efficiency
- Stainless steel machine housing and rotor



THERMAL-DRYER

Thermal low energy drying

- Optimised residual moisture for downstream extrusion
- Flexible application options thanks to modular design
- EcoDry version: particularly energy-saving thanks to the air heat exchanger

SEPARATING & STORING



DE-LABELLER

Reliable separation of labels or sleeves from plastic packaging

- Reliable label removal with zero plastics shredding
- Increased and optimised sortability



GRAVITER

Separation technology to segregate plastics according to density

- Utilisation of the reliable and effective float-sink process
- Available in three models with different throughputs
- Low water consumption



GRAVITER PET

Separation technology especially for PET washing facilities

- Best possible separation of PET flakes from PO flakes
- Low water consumption
- Frequency converter controls the discharge screws



FILM EXAMINER

Reliable separation of small, hard foreign materials in film fractions

- Separation takes place in the air stream of the extraction unit
- Unwanted materials are separated due to their different flight behaviour



CASCADE WIND SIFTER

Air flow separates the material in the sifter's cascades

- Separation efficiency thanks to a controlled air flow
- Cyclone and cascades made of stainless steel
- Throughput rate 2.000-5.000 kg/h



FLAKE SORTER

Reclassification of clean flakes for quality optimisation

- Use as a stand-alone machine or as part of a multi-stage sorting process at the end of the washing plant
- Subsequent sorting of flakes by colour and type of plastic



DOSING AND MIXING SILO

For sustainable optimisation of yield and profit

- Constant and uniform material output, regardless of the filling level
- Easy cleaning through easily accessible inspection opening

IT'S GOT SYSTEM.



Lindner Washtech HDPE plant
Reproplast, South Africa

Individual, turnkey solutions from a single source

For many decades, we have been designing, planning and building recycling facilities for a wide range of applications, such as the production of medium- and high-calorific alternative fuels or plastics recovery. Specialists from process engineering, mechanical engineering, electrical & control engineering and software development ensure that each facility is tailored to individual requirements. From consulting, planning and project management to commissioning, we take care of every detail, no matter how small.

High reliability with superior value chain depth, decades of experience and many Lindner in-house services:

- Experienced systems engineering team
- Extensive expertise thanks to more than 300 completed Lindner system projects
- In-house electrics and electronic production as well as in-house software development

SERVICE FOCUS.



Lindner's service – simply offering more.

Commitment and professionalism coupled with extensive expertise and original Lindner spare parts made in Austria ensure top quality service and highest machine availability. Individual service solutions mean maximum flexibility and the least downtimes – any day, every day.

Service à la Lindner:

- Remote assistance – fast help with remote maintenance
- High availability of spare parts thanks to extensive in-house production
- Original Lindner spare parts made in Austria for that extra level of quality

Maintenance – to keep everything running smoothly:

- Flexible maintenance offers for high machine availability
- Spare part packages for every application
- Qualified shaft reconditioning & hardfacing in line with the highest international standards

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