PDR

PRODUKTE DURCH RECYCLING

PDR - PRODUKTE DURCH RECYCLING.

(PDR - PRODUCTS VIA RECYCLING.)

sustainable. future-oriented. competent.

Dr. Thomas Hillebrand, CEO

Dear Reader,

Increasingly, people's focus today is on environmental awareness and, in turn, this is changing the economies of industrial nations into a balanced triad of business, ecology and social commitment.

Resource scarcity, climate change and rising prices for raw materials are clear indications that we need to pay more attention to conserving energy and resources for the economic growth in the future. This is where we would like to help you.

For more than 20 years PDR has been following a company policy of sustainability. Our goal is to work with our business partners to close material cycles. Wherever economically viable, we recycle production residues and waste into marketable products. Our company name reflects our mission: PDR - Products via Recycling.

We are continuously consolidating our leading role in the material recycling industry. As a recycling specialist, we also help our business partners sharpen their competitive edge. This is why resource scarcity is not just a reason to worry. We see it as a driving force for innovative solutions. Just like the art of origami, everything starts with a vision that becomes reality with a systematic approach, determination, care and precision.

The following pages contain a wealth of information about our company, our work and our goals. Read on to find out more about PDR.

PDR – sustainable. future-oriented. competent.

Your Thomas Hillebrand

Benefits of recycling.

A sustainable approach.

Our natural environment is our greatest treasure. And we want to play a part in ensuring it stays this way. Protect the climate and conserve resources using material recycling.

Efficiency.

Recycling is not an end in itself, it also needs to be efficient and profitable. Increasing material costs and resource scarcity make the use of recycled products a worthwhile venture.

Competitive advantages.

Closing material cycles ensures efficiency and competitive advantages. Because environment protection and recycling are convincing sales arguments.

Compliance with statutory requirements.

As a manufacturer, you are responsible for your products. Therefore, it makes sense to consider how products may be recycled during development.

Origami is the art of folding paper precisely and carefully, and requires extreme dexterity. Producing products via recycling also requires precision and care. In this way, new can be created from old, in an environmentally compatible and future-oriented process.

Benefits of cooperating with PDR.

Expertise in legislation and regulations

You can be sure that we follow and implement all EU directives and national laws. Just rely on us.

Handling problem waste.

You can count on us to solve your waste problems. We offer one hundred percent security in terms of environmentally-compatible recycling, even for special waste.

High recycling rate.

You can recognise the quality of recycling solutions from high material recycling rates and the opportunities to market the recovered products. This is the standard we set ourselves.

State-of-the-art technologies

We always look forward: We use sophisticated process technologies. We work closely with universities, research institutes and industrial partners to develop our technology.

Collection systems.

One of our strengths is that we are able to develop and operate nationwide collection systems - even for small parts. This is how we bundle material flows.

Logistics experience.

At PDR we have many years of logistics experience. We work with established logistics companies that are also able to transport special waste and hazardous goods reliably.

Service centre.

Take advantage of our service centre: Our qualified employees have a high level of expertise which comes into good use when processing orders, gaining new customers and advising existing ones. Get in touch.

7 steps from a product to products via recycling.

Achieving excellent quality standards: We take the word 're-cycling' literally. We integrate the recovery processes into production cycles and also create new products from waste.

Ideally, we recycle in seven steps. We take a systematic approach here. Our wide range of services satisfy the high standards in the industry. We have implemented professional processes that achieve high level reproducible results.

This high level of quality is reflected in our DIN EN ISO certificates:

- Quality management according to DIN EN ISO 9001
- Environment management / energy management according to DIN EN ISO 14001 / SpaEfV
- Health & safety management according to BS OHSAS 18001
- German Waste Disposal Specialist Regulations (EfbV) incl. primary treatment facilities in compliance with ElektroG (German Electrical Equipment Act)

A small work of art – designed in painstaking steps using the origami technique: the art of folding paper. This is how recycling also works: step by step. It takes several steps to turn discarded materials into input materials for new products. Precise and exact.

1

The feasibility study.

This study examines technical feasibility and also estimates cost-effectiveness, e.g. system costs, revenue from sales or cost savings in waste disposal.

2

Engineering.

Recycling requires sophisticated processes, e.g. mechanical, physical or chemical procedures. We develop unique recycling systems with partners from the research and business sectors.

3

Collection.

Material flows need to be bundled to ensure efficient recycling processes. If necessary, we are able to develop and operate a nationwide collection system for your waste material.

4

Quality assassurance.

We check the quality of all incoming and outgoing goods. We can analyse your waste and adapt the products so that you satisfy all your customers' requirements and also all statutory regulations.

5

The recycling process.

PDR operates its recycling facilities efficiently. Our goal is to continuously optimise work process and implement improvement measures on a consistent basis. This is where our strength lies.

6

The recycled product.

We recover high-quality products and base our work on our customers' requirements. At the same time we focus closely on achieving a very high level of quality. We guarantee good marketability.

7

Sales.

PDR is also the partner at your side after the recycling process. We help you find suitable buyers for recovered raw materials and also help your customers avoid squandering valuable resources.

The cycle closes.

Manufacturers.

Manufacturers are responsible for their products and their environmental compatibility: In the ideal scenario, PDR offers support right at the start of the product development process so that an optimum recycling solution can be worked out. We are also your partner for material recycling of production residues or scrapped charges.

Consumer/user.

We will also help you to collect or pick up waste from your customers by coming up with a suitable logistics solution. PDR helps you to inform consumers or users of your products about the recycling system. Experience has shown that the simpler the return system, the more accepted it is.

Return service.

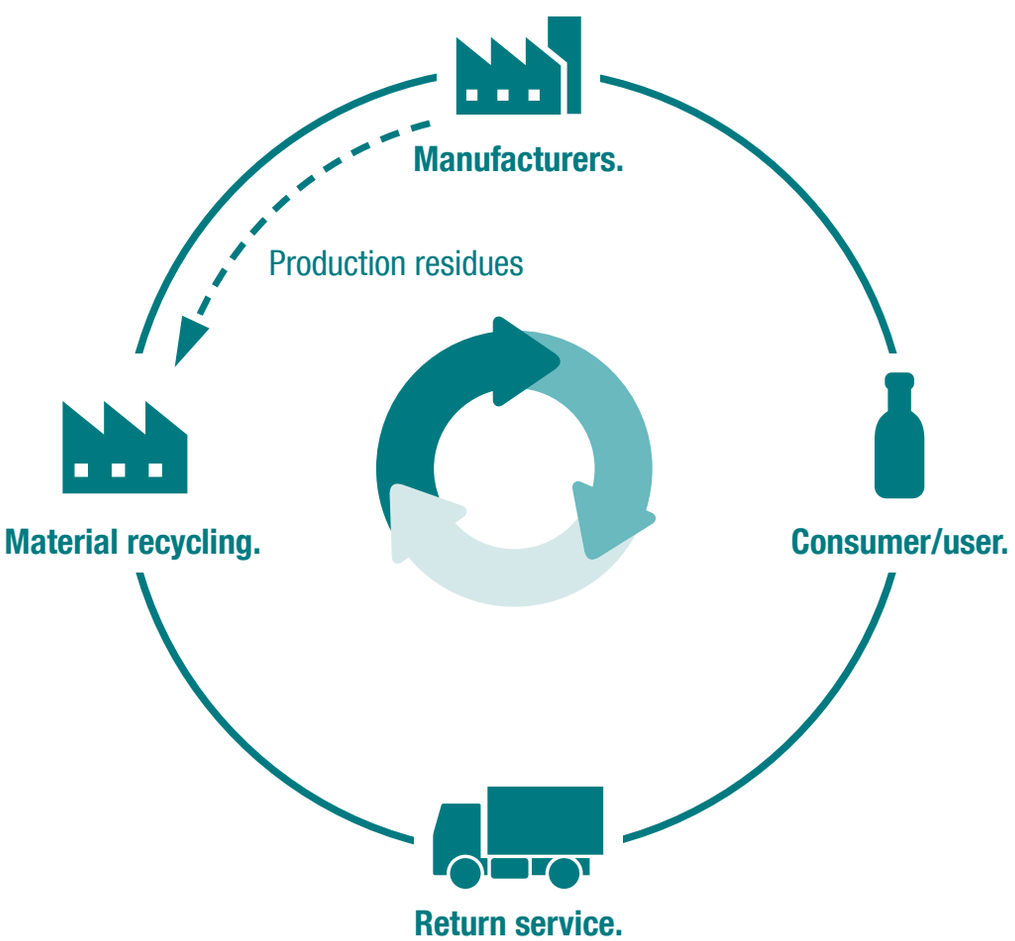
We have nationwide collection points to ensure the best possible service: Systems which are free of charge for the consumer enjoy the highest level of acceptance. PDR stands for efficient logistics to minimise CO_2 emissions.

Material recycling.

Sensible material recycling is far superior to disposal and incineration. This has also been proven by lifecycle analyses of recyclates. At the same time, material recycling can improve your carbon footprint.

A basic form becomes something new. Recycling also makes use of this technique, thereby creating new, functional products in an ingenious process. High-quality and recyclable.

The material recycling cycle.



Close the production cycle with PDR.

How can we work together?

Find out more about our services and contact us. Together we will find the best recycling solution for your needs.

We have included some examples and more information for you.

Trust PDR – feel free to contact us at any time:

innovation@pdr.de

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PRODUKTE DURCH RECYCLING

Recycling of PU foam cans: An intelligent solution for industry.

The challenge.

Used PU-foam cans have been classified as hazardous waste by lawmakers. PU-foam cans therefore cannot be disposed of with the household waste, "yellow sack" recycling waste, or in mixed construction- or scrap metal containers. But where are the cans supposed to go then? European PU foam can manufacturers which produce for the German market have established PDR to enable them to meet their product responsibilities.

The solution.

PDR has set up a nationwide collection system and a recycling solution for used PU foam cans. In this way PDR ensures **uncomplicated collection and material recycling**.

To make returning the cans as easy as possible for the consumers/users, our solution is based on the following basic services:

- **More than 2,000 collection sites** which can easily be located online.
- A **separate service centre** with knowledgeable contact persons who process orders, gain new customers and advise existing ones. Our employees are well versed in raising customer awareness of recycling.
- **Nationwide small parts logistics:** we want to offer local customer service and keep CO_2 emissions down to a minimum at the same time.
- We use **target group-specific information materials** when advertising solutions for the industry.

The recycling facility.

We have the only facility in the world capable of achieving **a recycling rate in excess of 95%** for returned PU foam cans; **around 80% by material**. Our biggest advantage: We do not just recycle the packaging, but also the residual content of the cans. In the recycling process we recover prepolymer (PREPUR®), propellant (TRIGAS®), and the following raw materials: plastic grist PE/PP, tin plate and aluminium.

The PU prepolymer and propellant are reused to produce construction foam. We ensure these raw materials go back into the production cycle.

Know-how.

An **ecological balance sheet** compiled by an external institute examined our approach and has shown that from an ecological point of view, our system is far superior to all other methods, in particular in terms of direct recycling of the residual material content. This is because these methods only recycle the packaging and incinerate the residual content.

More than 20 years of experience and a process-oriented management system guarantee a **reliable level of security**.

We are certified to BS OHSAS 18001 (health & safety management system) and never compromise:
· when it comes to handling or storing hazardous waste
· when storing flammable gases and fluids
· when fulfilling our obligations in compliance with the Hazardous Incident (Reporting) Ordinance
· in the consistent implementation of the German Ordinance on Hazardous Substances
· when observing hazardous goods regulations (ADR) when transporting goods
· in terms of compliance with explosion, fire and water protection

PDR has enjoyed a reputation as the recycling specialist for PU foam cans for more than 20 years and is highly accepted in the market.

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Recycling of Original HP Inc. ink cartridges: Partner to a global player.

The challenge.

HP Inc. was looking for an efficient recycling solution for its ink cartridges. Since environment protection and sustainability are core elements of HP Inc.'s mission, the company set out to find a system that would allow products recovered from ink cartridges to go directly into the production of new cartridges.

The solution.

HP Inc. started the global 'Planet Partners Program' – a nationwide collection system for used Original HP Inc. ink cartridges. PDR in Thurnau primarily focuses on recycling quantities for EMEA (Europe, Middle East, Africa).

The recycling facility.

We are proud of the fact that we are able to **recycle over 95%** of returned ink cartridges; **more than 70% by material**. In the only facility of its kind in Europe, we recycle the materials of Original HP Inc. ink cartridges based on type. The biggest challenge was to remove the ink cleanly from the solid materials. The innovative facility allows precious metals, high-quality plastics and steels to be recovered in a **multi-level recycling procedure** before returning them to the production cycle.

Know-how.

- Since 2002, PDR is the Hewlett-Packard (HP Inc.) partner for EMEA for the recovery of ink cartridges.
- PDR has in-depth experience in handling hazardous waste, such as ink residues.
- PDR is certified as an initial treatment facility to ElektroG (German Electrical Equipment Act).
- PDR is also involved in shipping waste across borders (EU Directive on the export and import of waste) and helps with the completion and review of official forms and papers.
- PDR uses a special software to guarantee the continuous documentation of material flows in compliance with HP Inc. specifications relating to e.g. input, storage, processing, recycling rate and output.
- PDR contributed to the development of an individual collection and retrieval concept.

One aspect of its cooperation with PDR that HP Inc. particularly appreciates is the continuous improvement of recycling technology. PDR delivers a constantly high level of quality that HP Inc. can rely on 100%.

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Recycling of coated abrasives.

The challenge.

When producing coated abrasives, waste is created, e.g. shortfall batches, stamping residues and scrap. Until now, production waste has been thermally recycled and then dumped, instead of undergoing a materials recycling process which would allow the abrasive grains to be recovered.

The solution.

PDR is a specialist for complex material recycling with the goal of creating marketable products. Our extensive know-how in the fields of chemical recycling and plastics processing, and years of operative experience in the control of sector solutions and as a partner to large OEMs serve as the basis for creating new recycling approaches for other sectors and waste types. In collaboration with the RWTH Aachen and an industrial partner, we have developed a recycling procedure of this kind within the scope of a project sponsored by the German Federal Foundation for the Environment (DBU), and we would like to establish a sector solution with you.

The recycling procedure.

The recycling process has five separate steps:

1. Preconditioning / shredding to guarantee a defined grain size distribution
2. Thermal material disintegration of abrasive grains and binding agents
3. Desagglomeration (careful separation of the abrasive grain-ash agglomerates)
4. Separation / screening (separation of the abrasive grains from the other materials, such as minerals and residual waste)
5. Classification according to FEPA-P norm

Results.

- The feasibility was verified for all process steps during the project.
- Abrasive agents made of recycling grains meet quality requirements and have abrasion and material properties that are similar to those of abrasive agents made of primary grain.

Your benefits at a glance.

- Economic benefits

+ Lower disposal costs compared to waste incineration or dumping
+ Lower purchasing costs because recycling grain can be marketed below the original grain price
+ Closed loop circulation of self-developed, high-quality abrasive grains

- Ecological benefits

+ Material recycling of the abrasive waste instead of thermal treatment with subsequent dumping
+ Reduction of primary energy needs and CO2 equivalents
+ Sustainable solution for abrasive waste that contains cryolite

Next steps.

- Erection of a recycling plant
- Development of a Europe-wide sector solution

We can help you to make a significant contribution to environmental protection, sustainability and resource conservation. Close the production cycle with us. Join us!

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