



**Saving Costs with Foundry Sand Regeneration –
a significant Contribution to the Circular Economy**

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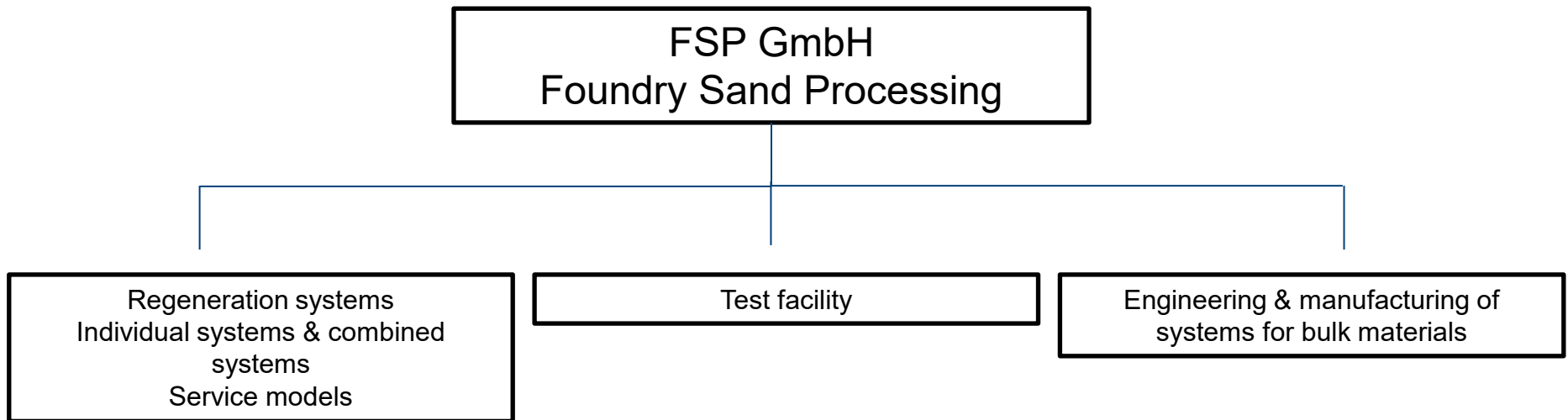
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Corporate expertise and technological development



Corporate Expertise and Technological Development

Technological Foundation and Industry Expertise

Thanks to decades of close collaboration with leading raw material suppliers and specialized foundry sand disposal companies, FSP GmbH possesses comprehensive know-how in the processing of mineral raw and used sands.

The range of technical expertise includes, in particular:

- ✓ Processing of raw and used sands
- ✓ Filtering and drying
- ✓ Storage and silo technology
- ✓ Pneumatic conveying
- ✓ Classification and dust removal
- ✓ Process optimization of sand cycles

This long-standing experience forms the basis for the development of proprietary regeneration technology.

Development of Wet Regeneration

Based on this technological expertise, FSP GmbH was commissioned by BMW AG (Landshut plant) to develop a regeneration solution that specifically utilizes the physical properties of silicate and water glass binders.

The goal was to develop a particularly gentle process with significantly less grain damage compared to conventional regeneration systems.

In close collaboration with Mercedes-Benz AG (Esslingen-Mettingen plant), the wet regeneration process was further developed to series production readiness and successfully implemented. The project has been in series production since October 2025.

Mercedes-Benz AG is currently supplied with approximately 12,500 tons annually. By April 2026, the customer base will be expanded to include another customer in the blasting media sector. The planned additional annual volume is approximately 10,000 tons. This means that wet regeneration is operationally validated and economically established.

Corporate expertise and technological development



Development of Mechanical-Thermal Regeneration

At the beginning of 2025, a pilot plant for mechanical-thermal regeneration was installed at the Stuttgart site.

In numerous test series with foundries in the aluminum, iron, and steel sectors, the following were successfully validated:

- the regeneration process was successfully validated
- the quality of the regenerated material was confirmed
- and its reuse in the production cycle was demonstrated

The technological feasibility and industrial applicability have thus been proven.

Scaling: Series Production Plant for Mechanical-Thermal Regeneration

The implementation of a series production plant with the following performance data is planned:

Throughput: approx. 2–2.5 t/h

Annual capacity: approx. 20,000 t

Even before the implementation of the series production plant, customer commitments have been secured, guaranteeing a utilization rate of up to 65% of the planned capacity.

This significantly reduces the market entry risk and creates a solid foundation for economic scaling.

Tasks of reclaiming

Aims and Objectives of Regeneration

The regeneration of foundry waste sand pursues both ecological and economic objectives. The focus is on transforming a costly disposal stream into a value-adding material cycle.

1. Maximizing the Recycling Process

Highest possible proportion of regenerated material in the production cycle

Minimizing material loss

Increasing the material recycling rate

The goal is a stable, closed sand cycle with high process reliability.

2. Avoiding Landfill Disposal

Reducing or completely avoiding the landfill disposal of contaminated waste sand

Lowering long-term disposal risks

Independence from limited landfill capacity

This actively addresses increasing regulatory and economic pressure.

3. Reducing the Use of New Sand

Substituting primary raw materials with high-quality regenerated material

Conserving natural resources

Stabilizing raw material costs

This leads to a direct improvement in material efficiency.

Tasks of reclaiming

4. Reduction of Transport Costs and CO₂ Emissions

- Fewer transports for disposal
- Fewer transports for new sand procurement
- Reduced CO₂ emissions along the value chain

In addition to the economic benefits, this results in a clearly measurable ESG added value.

5. Optimization of Regeneration Capacity

- Improved sand regeneration behavior
- Gentle processes to minimize grain damage
- Stabilization of physical properties

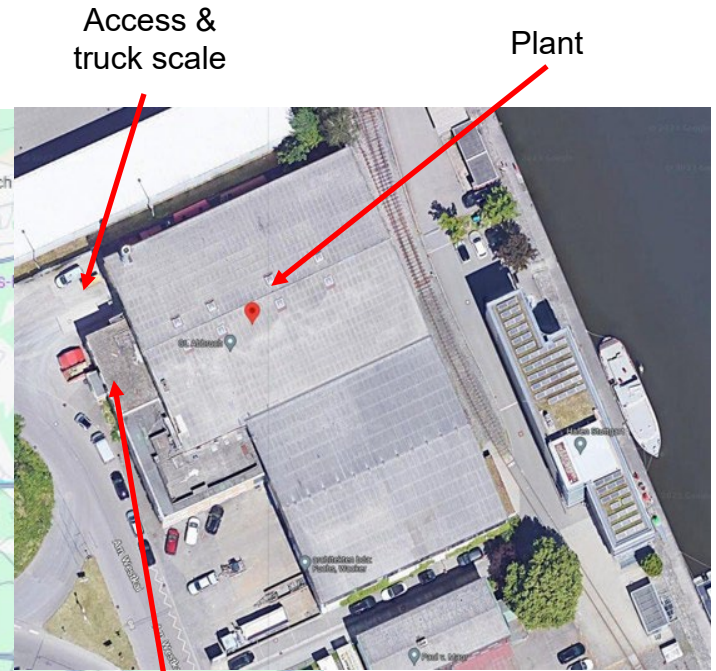
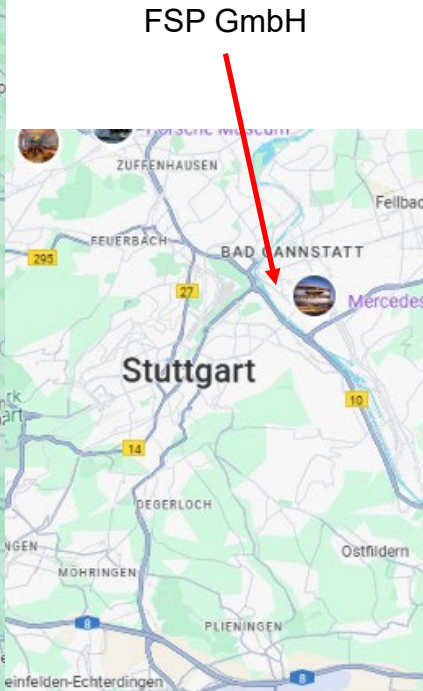
This increases the technical quality of the regenerated material and improves its reusability in the production process.

Overall Objective

Regeneration combines economic efficiency, resource efficiency, and future regulatory compliance in an integrated circular economy model.

It is therefore not just a replacement for disposal, but a strategic production component of modern foundries.

Site and infrastructure concept



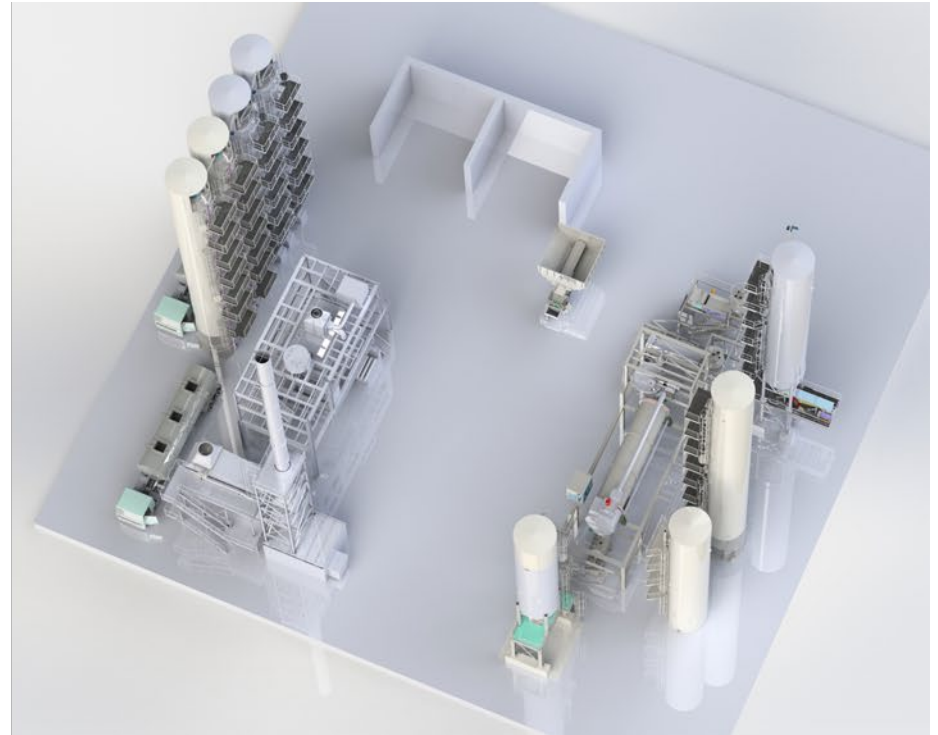
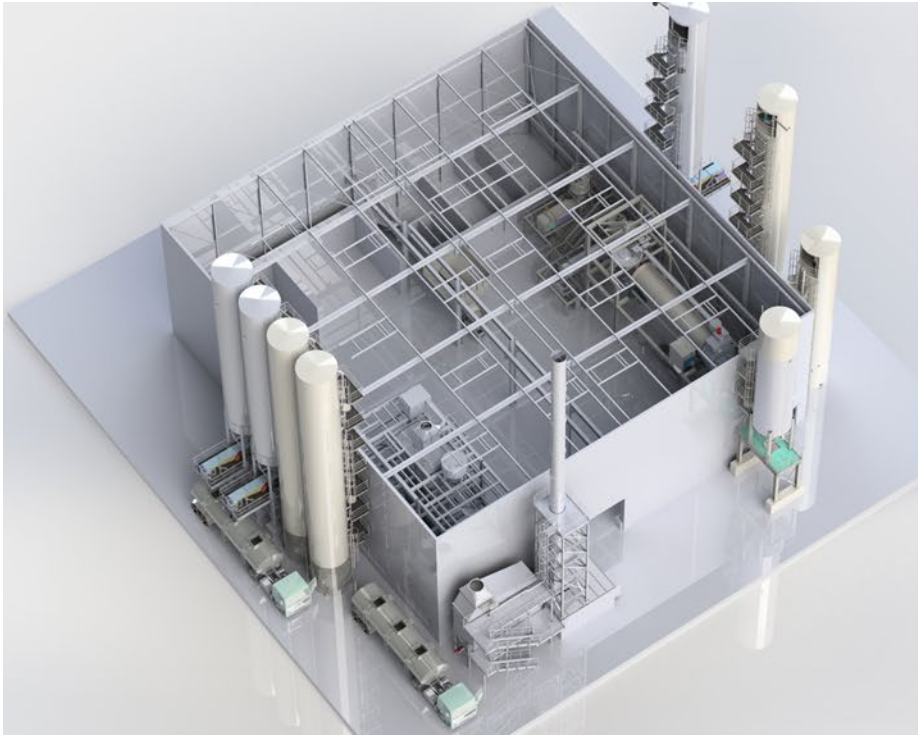
FSP GmbH

Access & truck scale

Plant

Office & Laboratory

Site and infrastructure concept



Patented wet reclamation - Introduction

The development of series production systems has so far been hampered by the treatment of the wash water – in its used state, it contains residual metals and dissolved additives – which, in the concentrations encountered, must not enter the wastewater. Furthermore, the system must operate energy-efficiently, as the required heat energy is wasted in comparable regeneration systems. For this purpose, a now-patented drying system was developed and integrated.

The system is state-of-the-art and takes into account economic and ecological requirements – cost reduction and energy efficiency, as well as resource conservation and sustainability.

At the same time, the system must meet the technical requirements and quality characteristics of the regenerated material itself. These requirements are described below.

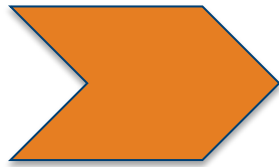
In cooperation with Mercedes-Benz AG – Esslingen-Mettingen plant – and various other aluminum foundries, as well as with the leading manufacturers of water glass binders – Hüttenes-Albertus GmbH and ASK Chemicals GmbH – various regeneration trials have been conducted over the past three years.

The complete analysis and evaluation of the trials – conducted by the foundry and, for comparison purposes, by the binder manufacturers – show that the results meet the requirements.

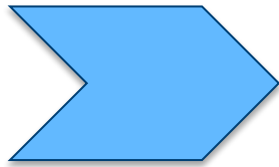
With the results confirmed so far, it is possible to manufacture and cast core geometries from recycled sand that were previously only possible with virgin sand.

The entire system has a modular design, allowing it to be integrated into existing sand processing plants or set up as a stand-alone unit.

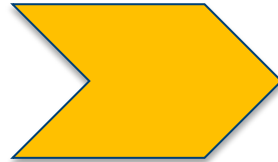
Wet reclamation - process flow



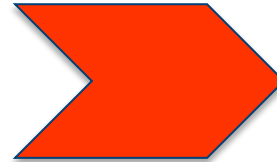
Sand Feeding



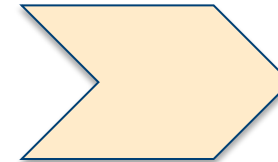
Washing



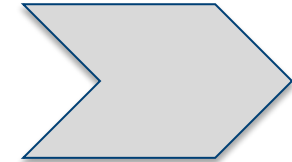
Filter



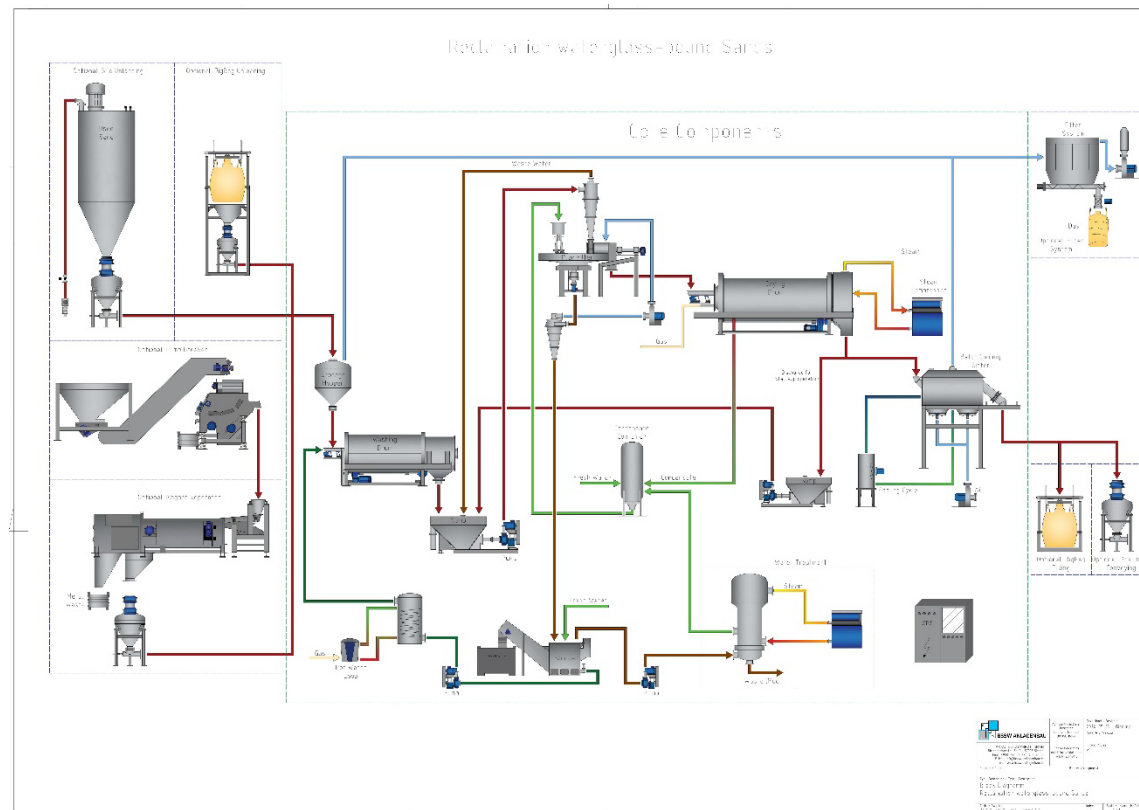
Drying



Sifting



NE separation



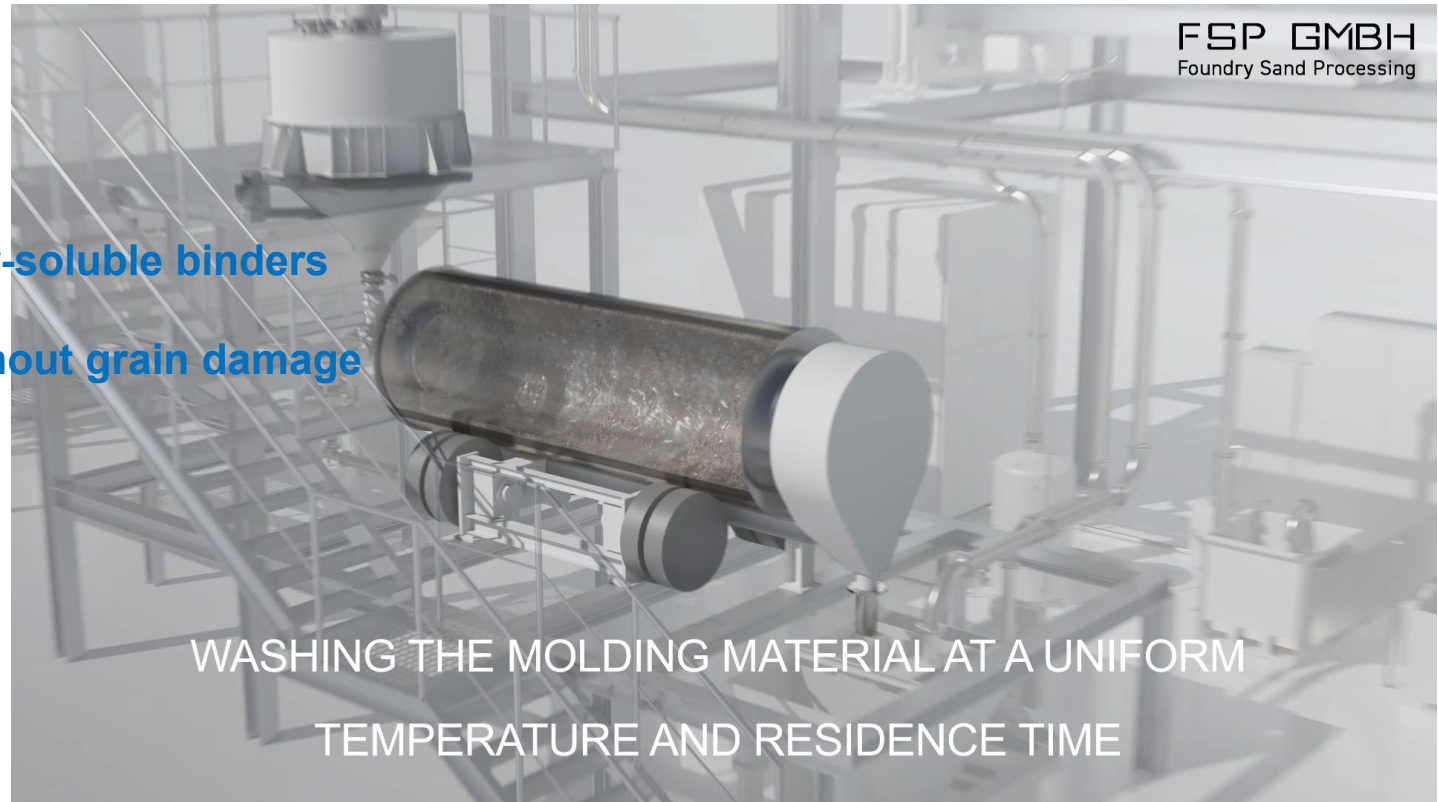
Sand Feeding

- ✓ Feeder
- ✓ Pre-separation of coarse components
- ✓ Dosage & Homogenization



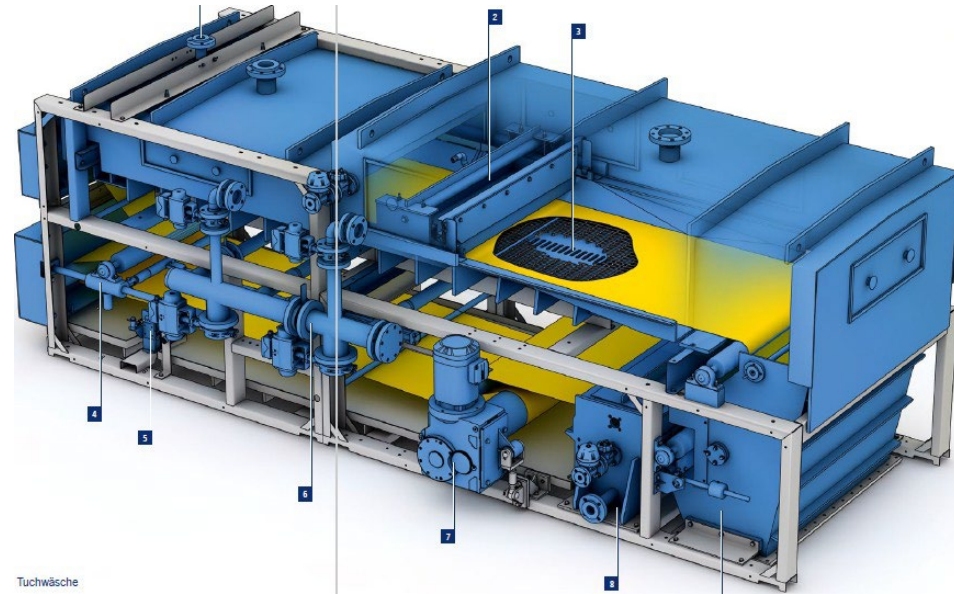
Washing – core process of wet reclamation

- ✓ **Dissolution of water-soluble binders**
- ✓ **Gentle cleaning without grain damage**
- ✓ **Closed water cycle**



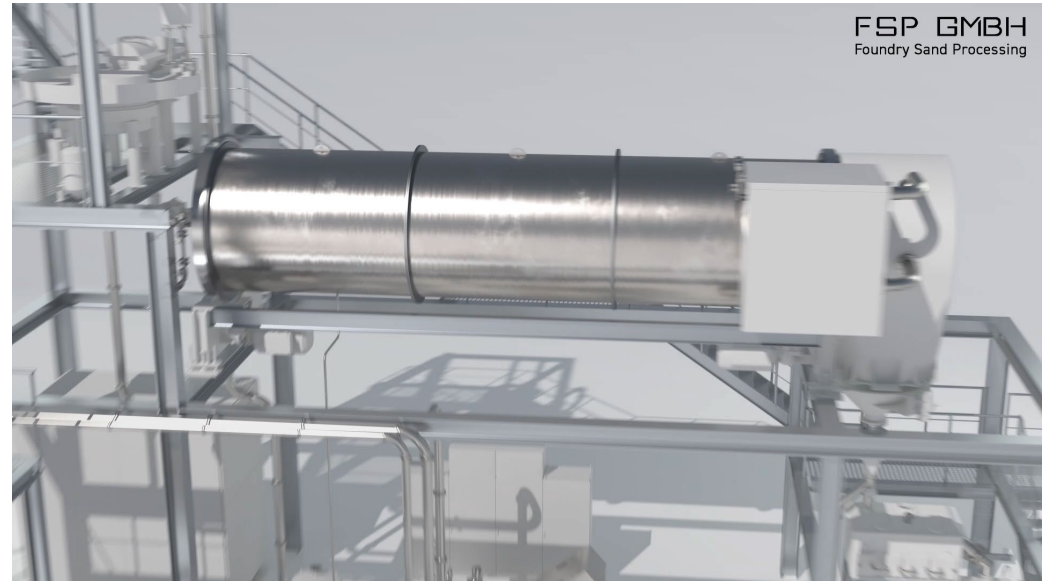
Filter – Vacuum filtering system

- ✓ Solid-liquid separation
- ✓ Filter cake formation
- ✓ Recovery of process water



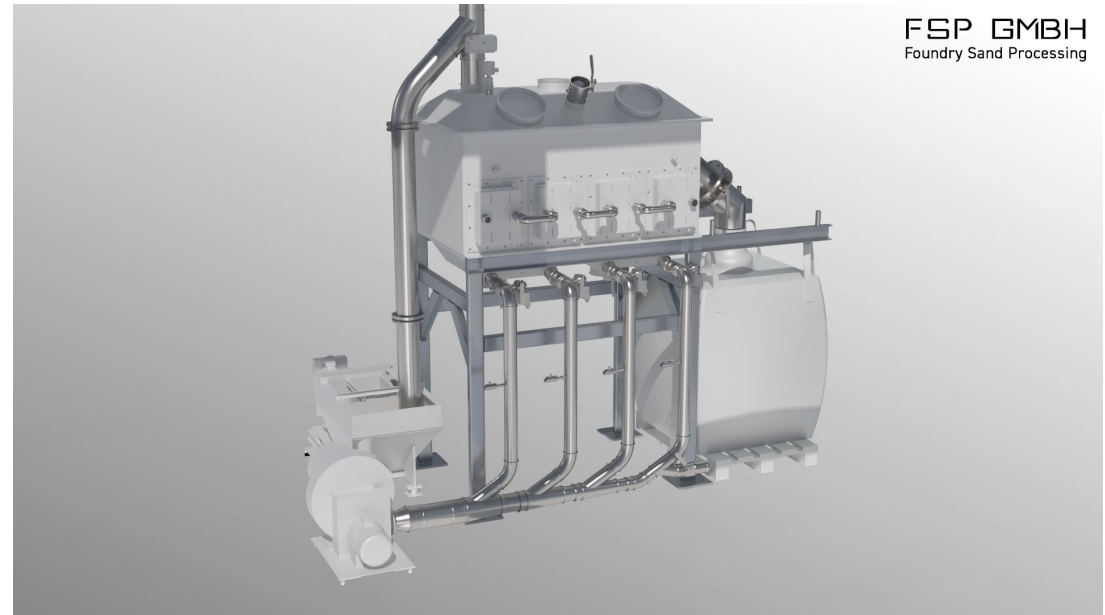
Patented drying

- ✓ **Double-walled drum**
- ✓ **Condensation energy recovery**
- ✓ **Up to 65% energy savings**



Patented sifting & dust removal

- ✓ Sifting of sand
- ✓ Removal of fine particles
- ✓ Cooling of the material



Non-ferrous metal separation

- ✓ Removal of non-ferrous metals
- ✓ Eddy current separator



Quelle Sollau

CHP plant - wood chip plan

- ✓ **Production of Heat**
- ✓ **Use for water treatment**
- ✓ **Conversion into electricity**



Water treatment

- ✓ **Treatment of wastewater or process water**
- ✓ **Separation of residual materials from the washing process**
- ✓ **Conversion to distilled water for use in the further washing process**



Quelle Spanner Re²

Quality characteristics of wet reclamation

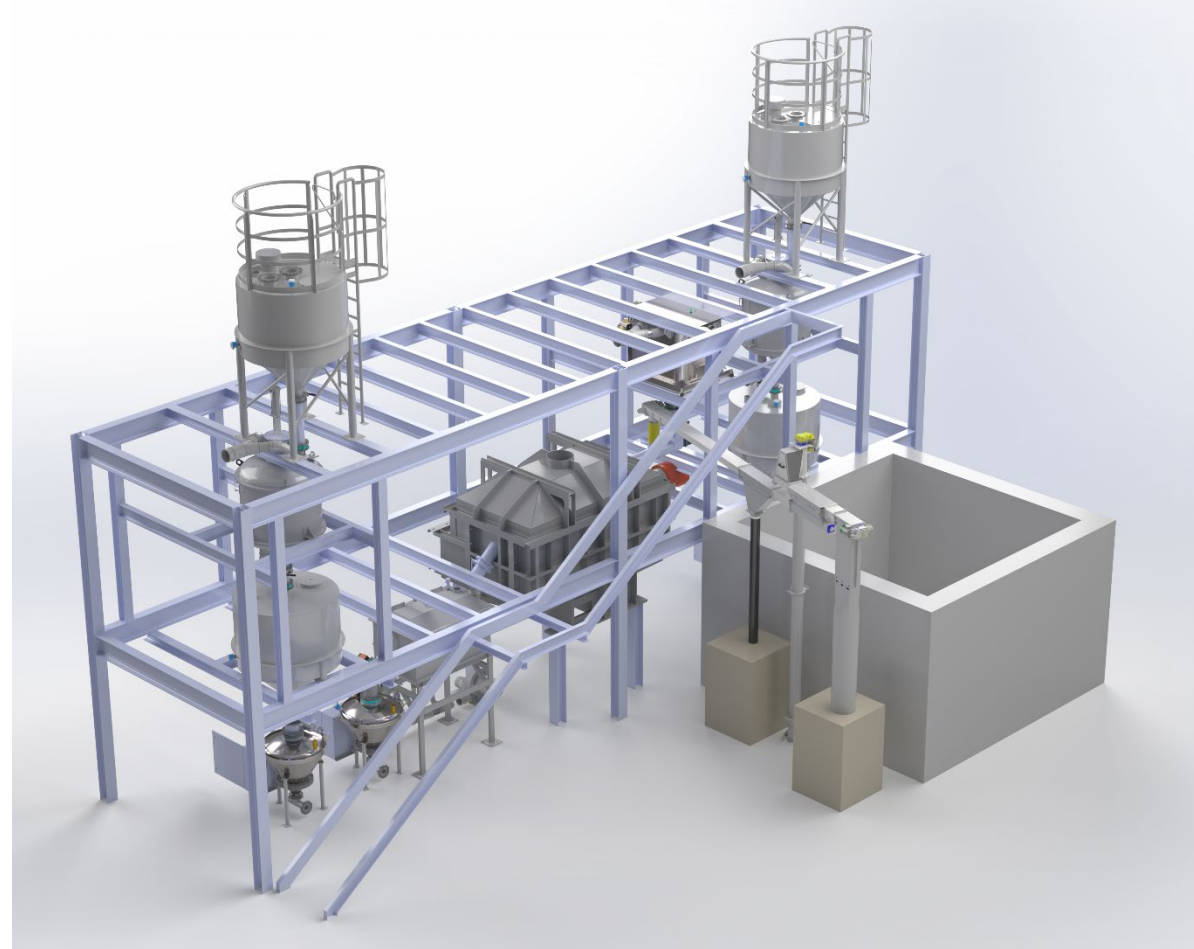
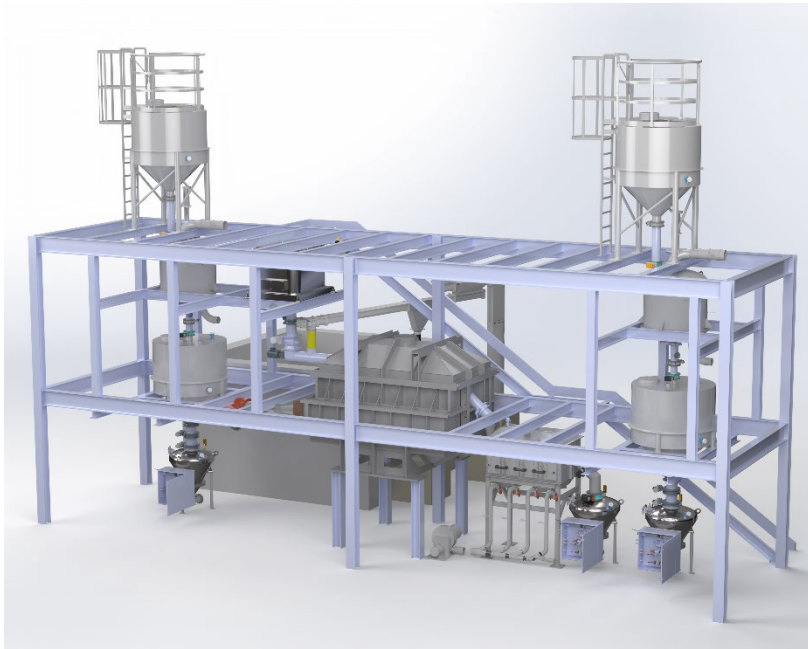


The quality of core production is largely determined by the properties of the molding material used – the recycled material.

- ✓ Dust content (%)
- ✓ pH value (10-13)
- ✓ Residual alkalinity < 100 mg H₂SO₄ / 100 g molding material
- ✓ Electrical conductivity < 1000 μS/cm
- ✓ Loss on ignition (%)



Mechanisch-thermische Regenerierung



Mechanical-thermal reclamation



As we developed, built, and commissioned our wet regeneration process, and as FSP and our operating model gained increasing recognition, we received numerous requests to also address the regeneration of organically bound waste sand and to expand our operating model accordingly.

Together with a partner company, we quickly built and commissioned a pilot plant. Extensive testing with over 30 different foundries across Germany convinced us that the regeneration of green sand and mixed sands containing cold box material can be established just as successfully and with consistent quality.

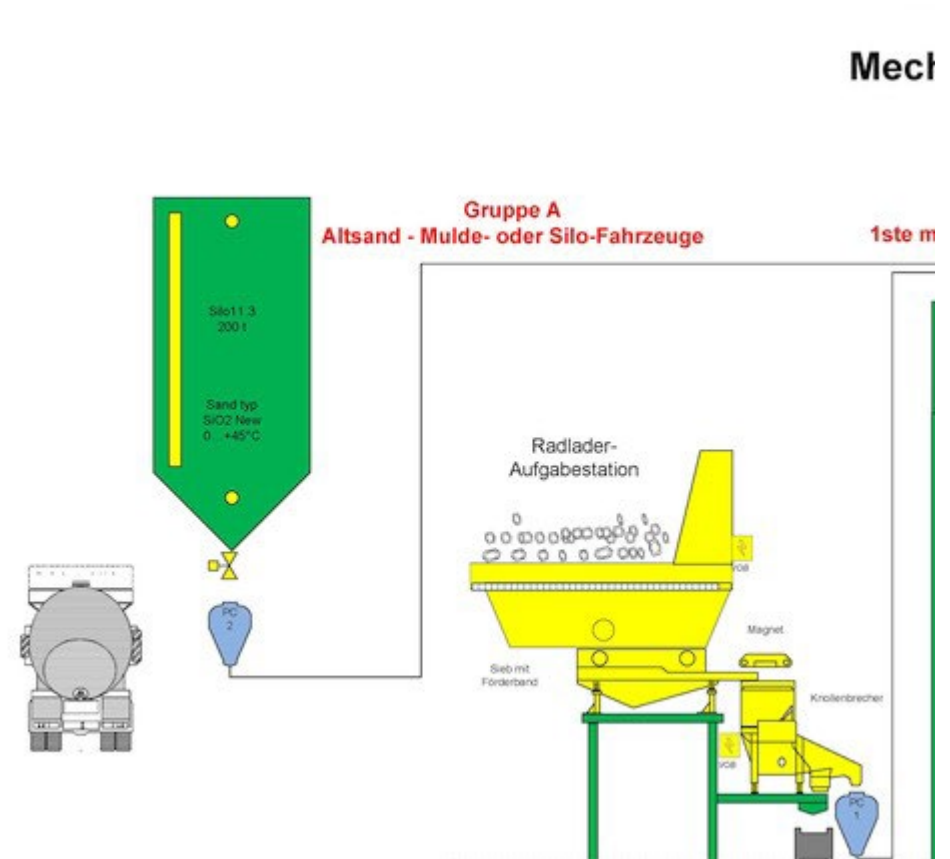
In addition to our patented wet regeneration process, we are currently planning the construction and operation of a mechanical-thermal regeneration plant, with completion and start of series production expected by the end of Q3/beginning of Q4.



Group A

The used sand can be delivered either from a silo truck – dry and free-flowing – or via tipper trucks.

In this case, the used sand passes through a crushing system with screening, drying, and metal separation before being transferred to the first-stage feed hopper



Mechanical-thermal reclamation

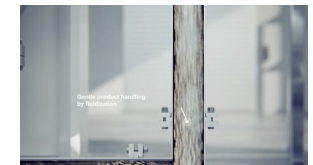
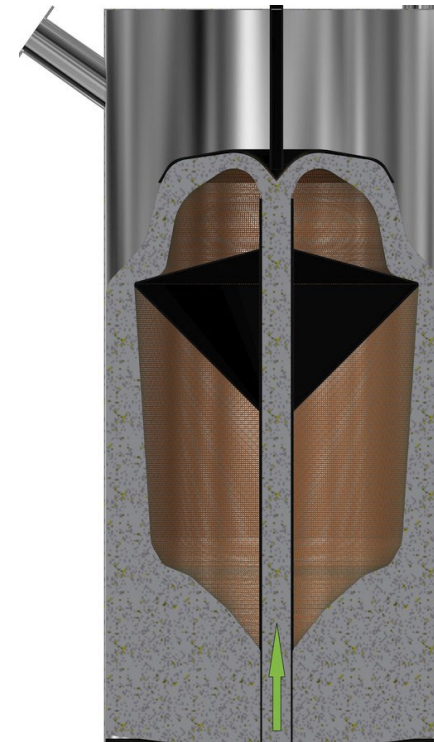
Group B

After the initial feed, the sand is fed to the first mechanical stage in a cascade process. Here, the old sand is intensively rubbed against itself using an air system.

The principle is that the high centrifugal force in the conveying pipe causes the sand to separate slightly from the wall, be drawn to the center, and thus create almost pure grain friction.

This process gently loosens and removes any adhering binder components..

Gruppe B
1ste mechanische Stufe



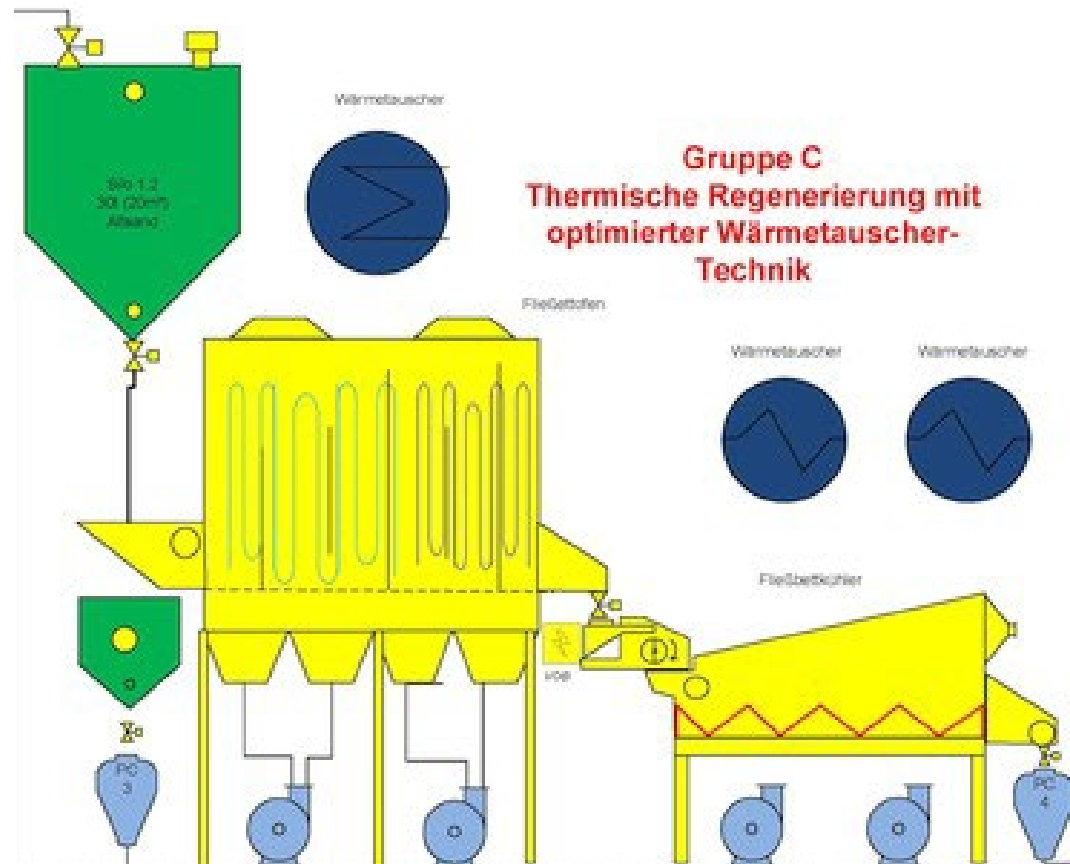
Group C

The material then enters the thermal stage. In the fluidized bed furnace, the sand is heated to approximately 650 °C and fluidized.

Special feature of the pre-combustion chamber:
The gas-air mixture is not ignited in the sand bed!

The rising fine organic particles are completely combusted in the upper part of the system at temperatures of 850 °C to 900 °C.

Optimized use of process air:
The exiting process air is used to dry/heat the used sand or to cool the regenerated material.

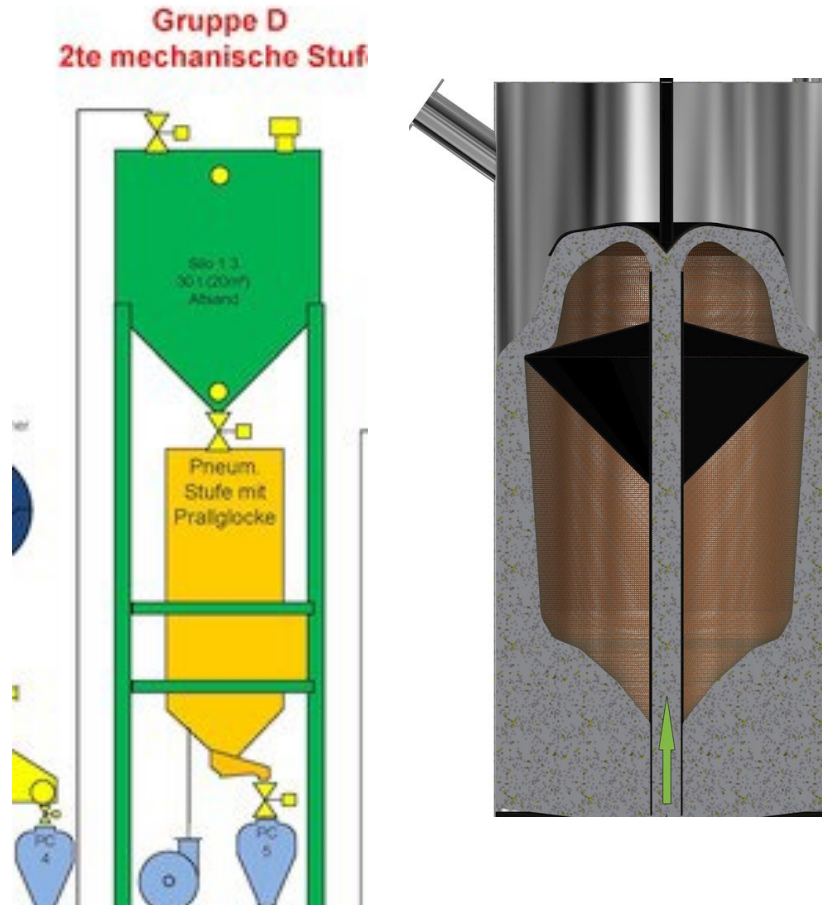


Mechanical-thermal reclamation

Group D

If necessary, the material is transferred to a third stage. This stage operates analogously to the first mechanical stage and serves as a fine-tuning stage for the regenerated material.

It is only used if sufficient purification was not achieved in the preceding stages.

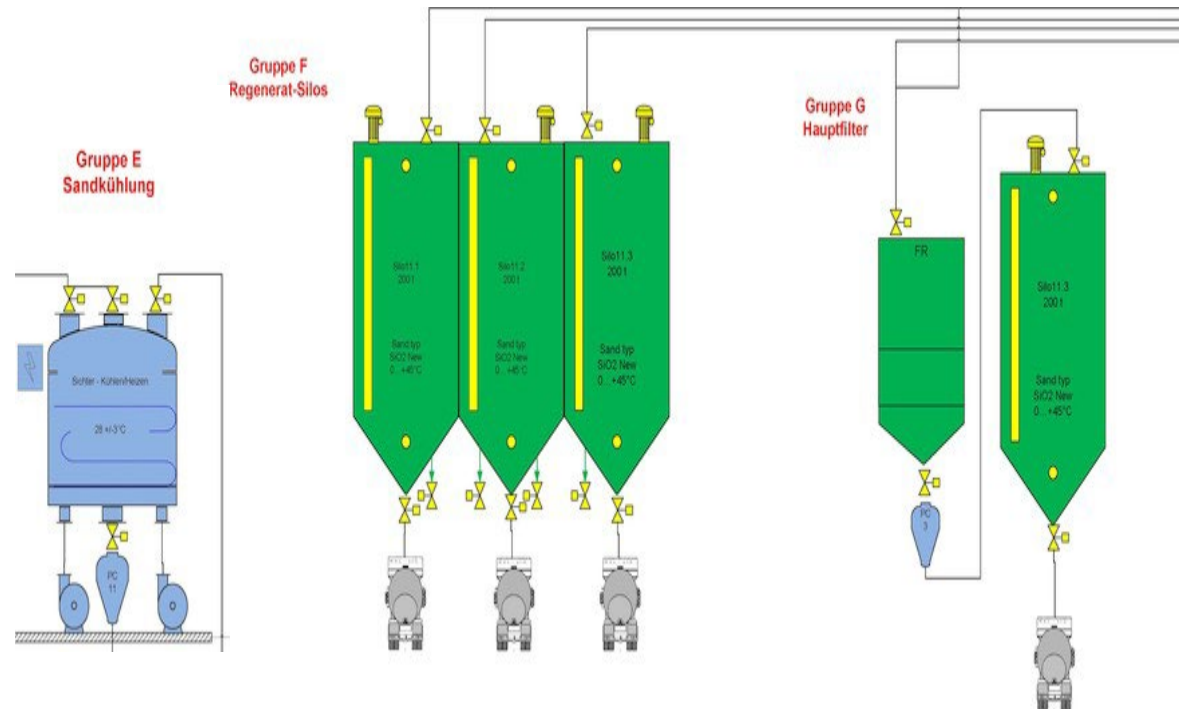


Groups E to G







In the final process step, any remaining fine particles (dust) in the classifier are separated from the recycled material, and the material is cooled.

The dust is conveyed to the appropriate dust silo.

The processed recycled material is then conveyed to the designated silo.



Conclusion – Why reclamation??

-  Reduced primary demand – Less new sand is required through regeneration, conserving natural resources.
-  Resource cycle – Closed cycle through continuous processing and reuse of sand.
-  Maximizing the lifespan of molding sands – Minimizing waste through efficient use.
-  Reducing landfill load – Regeneration prevents the disposal of used sand in landfills.
-  Energy reduction – Use of modern, energy-efficient processes and plant technology.
-  CO₂ reduction – Less new sand production and optimized material transport (full-to-full instead of full-to-empty) reduce CO₂ emissions.

Thank you for your attention. I am happy to answer any further questions you may have, either immediately afterwards or in the coming days, also by email!

Glück auf!!!