sinto FOUNDRY INTEGRATION

Why Sand Reclamation

Motivation and Economic Aspects

23.04.2026

Stefan Ermert

Mechanical Sand Reclaimer USR - II

1. Global Resources and Sand Consumption
2. Overview of Existing Market Technologies
3. Introduction of the USR-II System
4. Test Results and Performance Data
5. Case Studies from Industrial Applications
6. Conclusion

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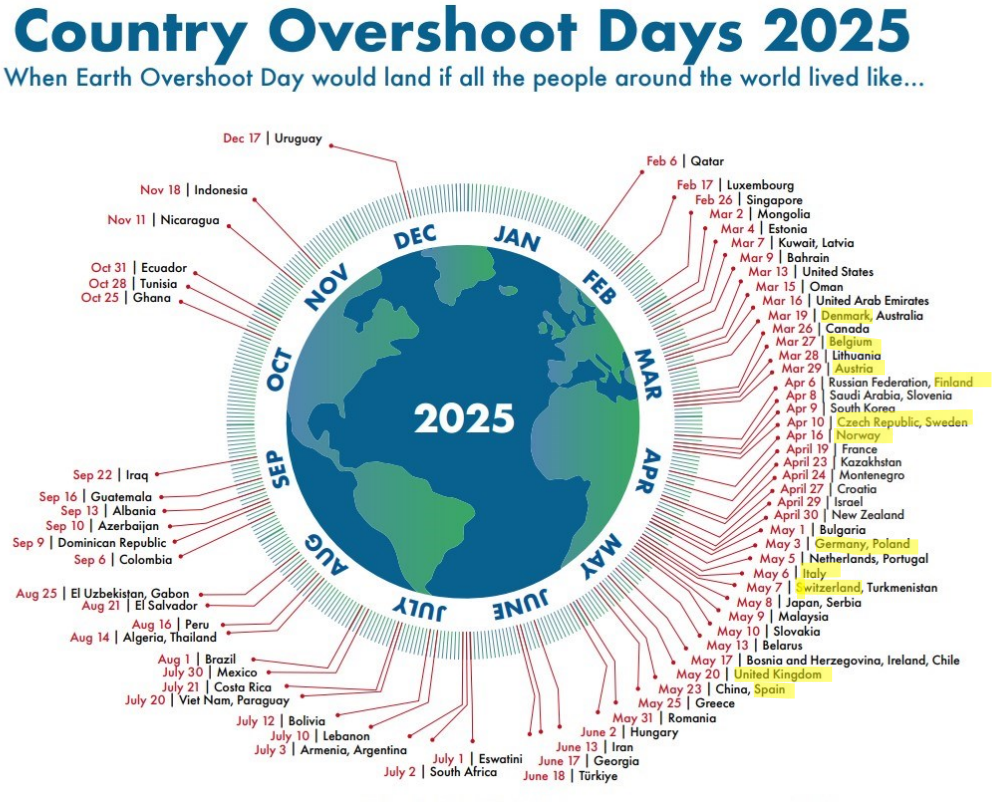
Why Sandreclamation?



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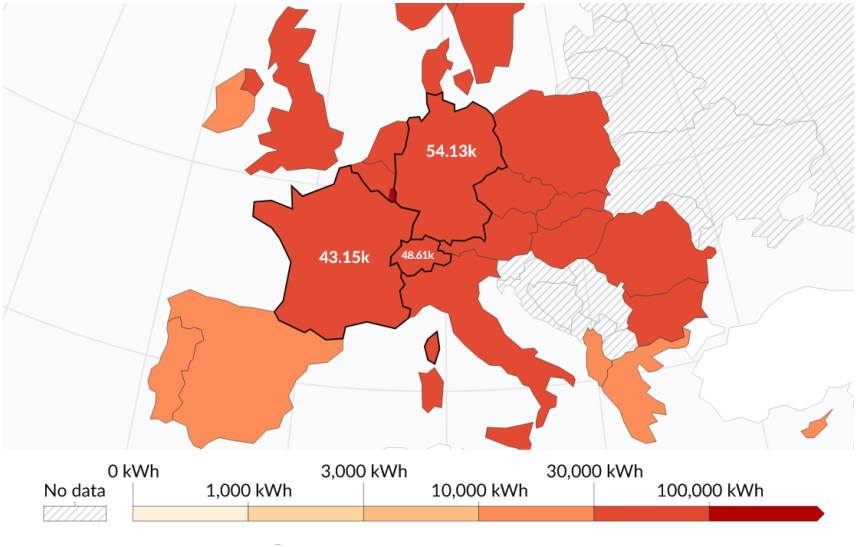
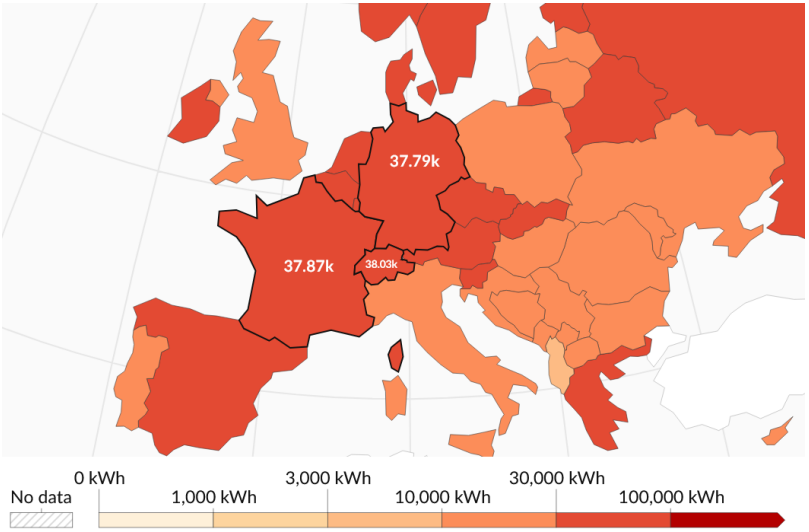
Energy Consumption per Person Europe (1980 – 652 Mio / 2024 – 747 Mio)



1980



2024

https://ourworldindata.org/energy#introduction

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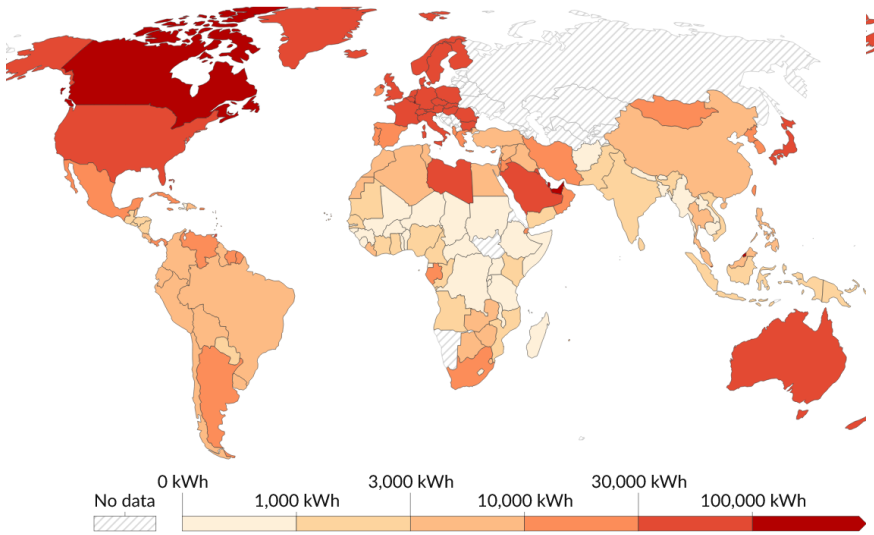
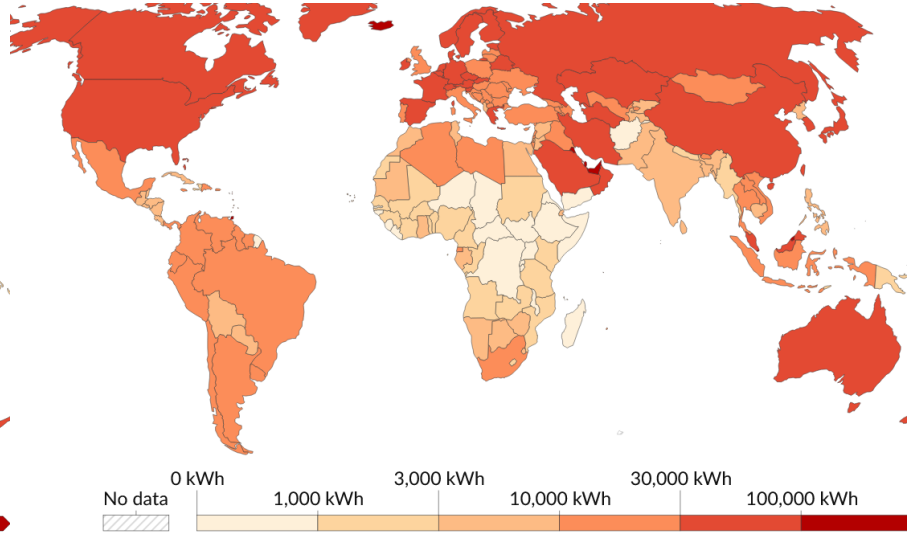
Energy Consumption per Person World (1980 – 4,47 Bn / 2024 – 8,15 Bn)



1980



2024

https://ourworldindata.org/energy#introduction

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UNEP – Sand & Sustainability: Key Recommendations

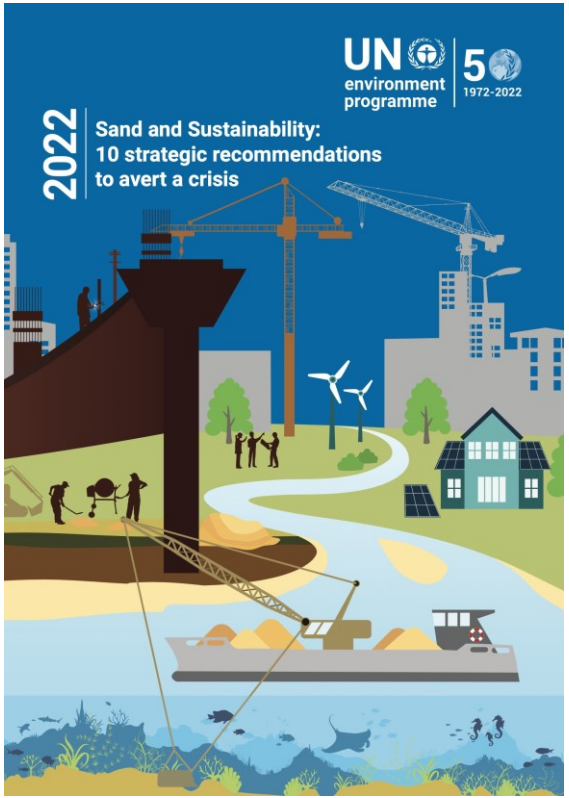
1. Recognize Sand as a Strategic Resource
Sand underpins ecosystems, biodiversity, and critical infrastructure.
→ Treat sand as a *strategic and finite* resource essential to sustainable development.

2. Include Place-Based and Social Perspectives
Local communities must be part of decision-making.
→ Ensure *inclusive governance* and a *just transition* for those impacted by the sand economy.

3. Shift to a Circular and Regenerative Future
Move from a linear "take–make–waste" model to a circular one.
→ Promote reuse, recycling, and innovative materials to reduce sand dependency.

4. Integrate Policy and Legal Frameworks
Align sand management across sectors and scales.
→ Build *coherent, multi-level governance* linking local, national, and regional regulations.

5. Define Ownership and Access Rights
Clarify mineral rights and licensing for sand extraction.
→ Create *transparent, fair, and enforceable* access mechanisms.



https://www.unep.org/resources/report/sand-and-sustainability-10-strategic-recommendations-avert-crisis

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🌍 UNEP – Sand & Sustainability: Key Recommendations

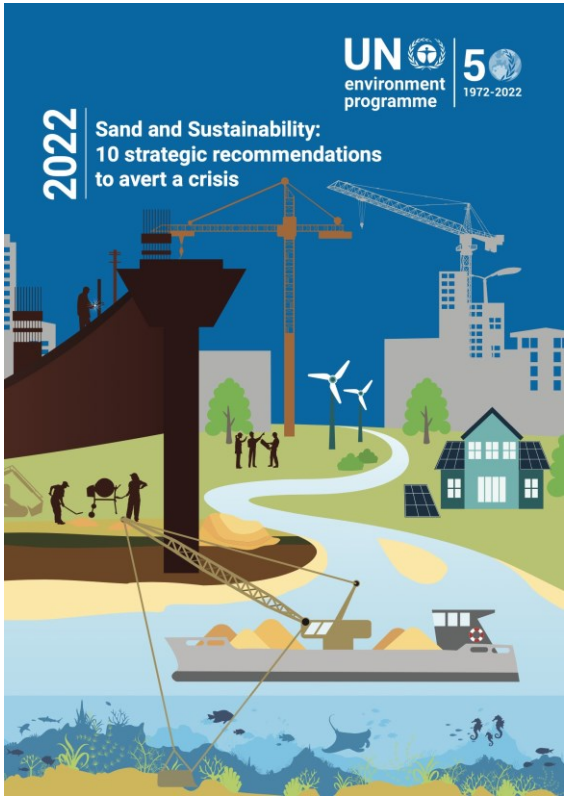
6. Map, Monitor, and Report Sand Resources
Establish global data systems for sand flows and stocks.
→ Enable *science-based, data-driven* policy decisions.

7. Develop Standards and International Frameworks
Adopt best practices and harmonized norms.
→ Implement *global guidelines* for sustainable sand extraction and trade.

8. Promote Resource Efficiency and Substitution
Reduce consumption through efficiency and innovation.
→ Encourage *use of recycled materials* and viable *alternatives to natural sand*.

9. Source Responsibly
Ensure ethical, sustainable, and socially conscious supply chains.
→ Include *sustainability criteria* in all procurement processes.

10. Restore Ecosystems and Compensate Losses
Rehabilitate degraded sites and protect biodiversity.
→ Apply *nature-based solutions* and *compensation schemes* for unavoidable impacts.



https://www.unep.org/resources/report/sand-and-sustainability-10-strategic-recommendations-avert-crisis

Mechanical Sand Reclaimer USR - II

50 billion tons per year: enough to build **a wall 27 metres wide and 27 metres high around planet Earth**. This is the volume of sand and gravel used **each year**, making it the second most used resource worldwide after water. Given our dependency on it, sand must be recognised as a strategic resource and its extraction and use needs to be rethought, finds a new report by the United Nations Environment Programme (UNEP).

Sand Consumption in Foundries business is about 3-5%

https://www.unep.org/resources/report/sand-and-sustainability-10-strategic-recommendations-avert-crisis

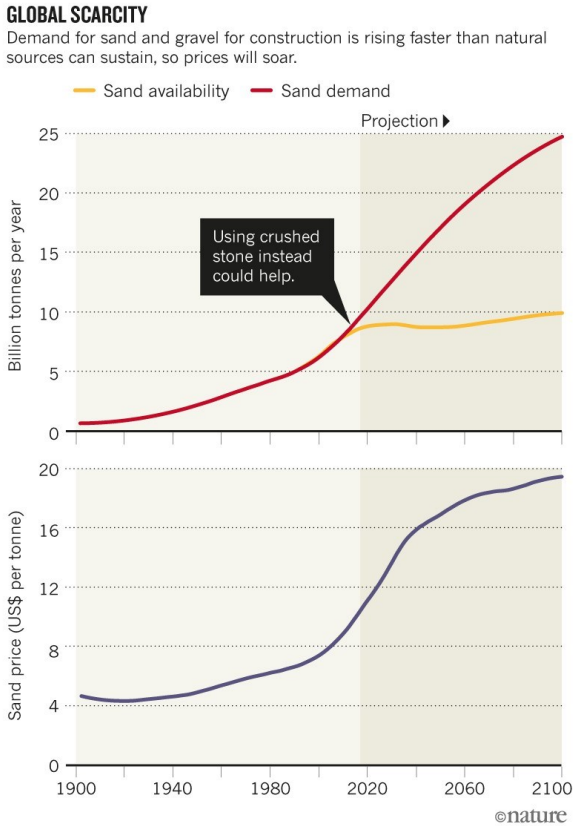
Mechanical Sand Reclaimer USR - II

Table 3-1: Top 10 global sand importers and exporters (Massachusetts Institute of Technology, 2018).

Exporters	Gross value (USD x 10^6)	Share of world total (%)	Importers	Gross value (USD x 10^6)	Share of world total (%)
USA	363	19	Singapore	176	9.2
Germany	166	8.7	Canada	141	7.4
Netherlands	159	8.3	Belgium	138	7.2
Belgium	155	8.1	Netherlands	132	6.9
Australia	134	7	Germany	122	6.4
Malaysia	120	6.3	China	99	5.2
China	61	3.2	Japan	88	4.6
Vietnam	61	3.2	Italy	63	3.3
France	59	3.1	Mexico	63	3.3
Saudi Arabia	55	2.9	UAE	55	2.9
Total Top 10	1,333	70	Total Top 10	1,077	56
World total	1,910	-	World total	1,910	-

Table 3-2: Top 10 global importers and exporters of aggregates. (Massachusetts Institute of Technology, 2018)

Exporters	Gross amount (USD x 10^6)	Share of world total (%)	Importers	Gross amount (USD x 10^6)	Share of world total (%)
UAE	619	26	Qatar	405	17
Norway	214	9.0	USA	198	8.3
China	190	8.0	Netherlands	186	7.8
Germany	171	7.2	Singapore	169	7.1
Belgium	114	4.8	Germany	124	5.2
France	100	4.2	Kuwait	124	5.2
Mexico	74	3.1	Hong Kong	112	4.7
Canada	71	3	France	102	4.3
Indonesia	76	3.2	Switzerland	95	4
UK	67	2.8	Denmark	64	2.7
Top 10 total	1,697	71	Top 10 total	1,578	67
World total	2,380	-	World total	2,380	-



https://www.front-materials.com/news/sand-used-for-construction

Mechanical Sand Reclaimer USR - II

How long does it take to grow up sand….!

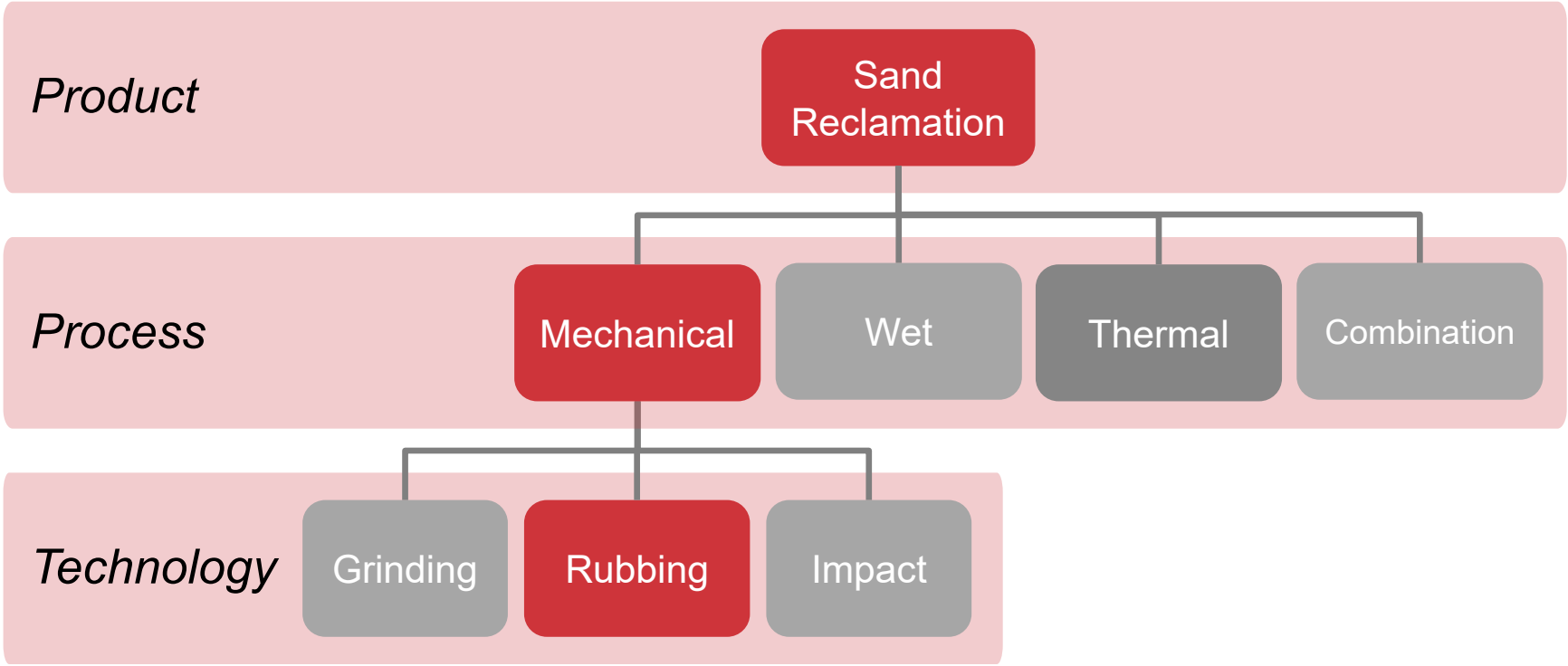
Process Stage	Approximate Duration	Main Factors
Rock weathering	10,000 – 1,000,000 years	Climate, rock type
Transport & sorting	1,000 – 1,000,000 years	Water, wind, ice
Deposition & sand formation	10,000 – 10,000,000 years	Tectonics, sea level, climate
		Combined geological processes
Total cycle	**≈ 100,000 to several million years**	

Sand is **not a renewable resource** on human timescales.
Natural sand formation takes **hundreds of thousands to millions of years**, while current global extraction (≈ 40–50 billion tons per year) far exceeds nature's regeneration rate.

https://www.front-materials.com/news/sand-used-for-construction

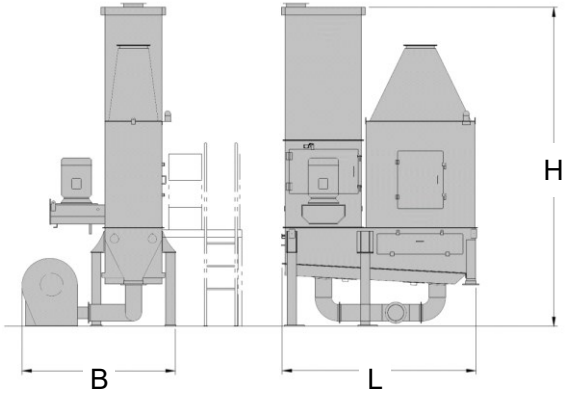
Mechanical Sand Reclaimer USR - II

Classification of typical sand reclamation systems



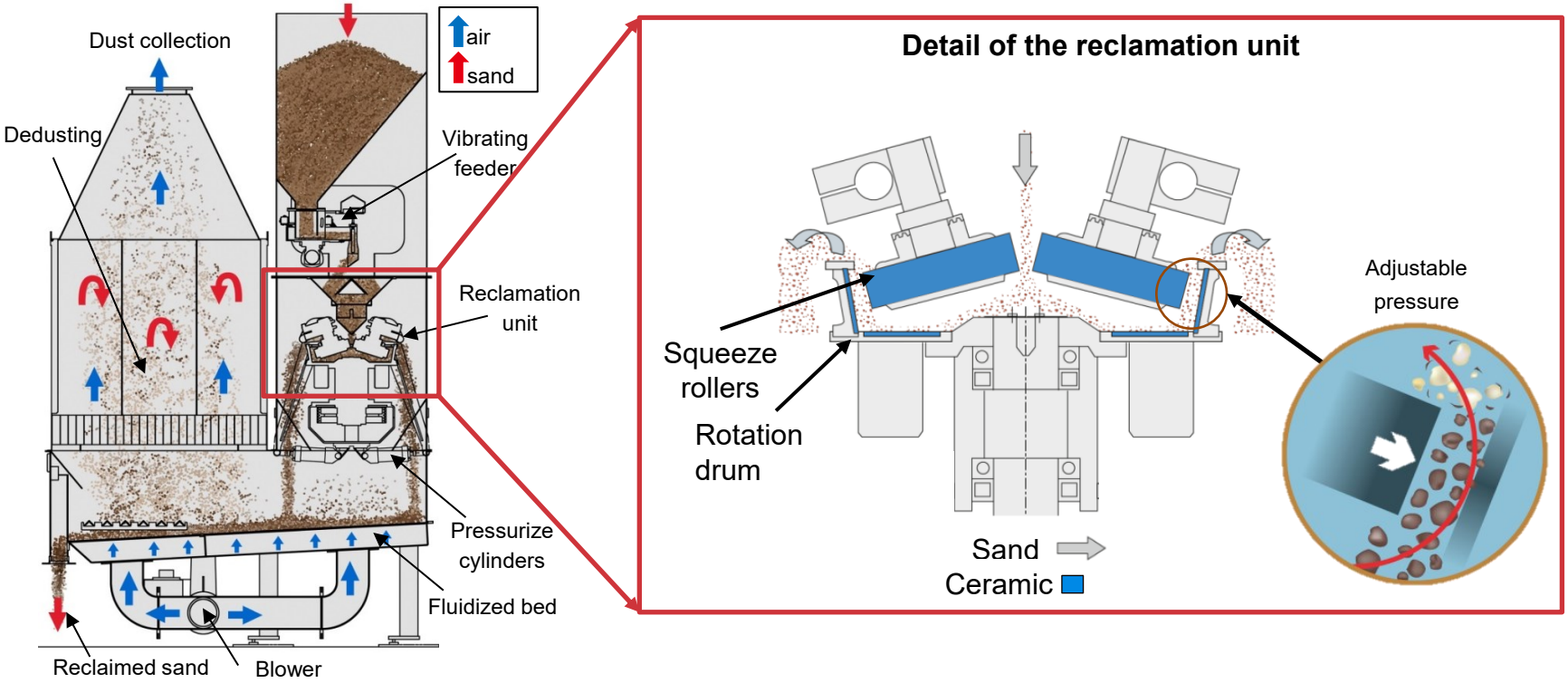
Mechanical Sand Reclaimer USR - II

Pictures show a simplified and schematic machine.



USR-II		
Motor [kW]		37
Throughput [t/h]		max. 5
Blower [kW]		5,5
Dust collector [m³/min]		ca. 50 - 100
Dimensions [mm]	L	2500
	B	1975
	H	min. 4200

Mechanical Sand Reclaimer USR - II



Mechanical Sand Reclaimer USR - II

Example 1 – green sand foundry with 10-20% cold box core sand:

Sand-analysis	AFS	average grain size mm	moisture
used sand	54,4	0,269 mm	-
1. pass	56,0	0,249 mm	0,36 %
2. pass	57,1	0,244 mm	0,15 %
3. pass	55,5	0,252 mm	0,09 %
4. pass	55,9	0,250 mm	0,05 %

Used sand

1. pass

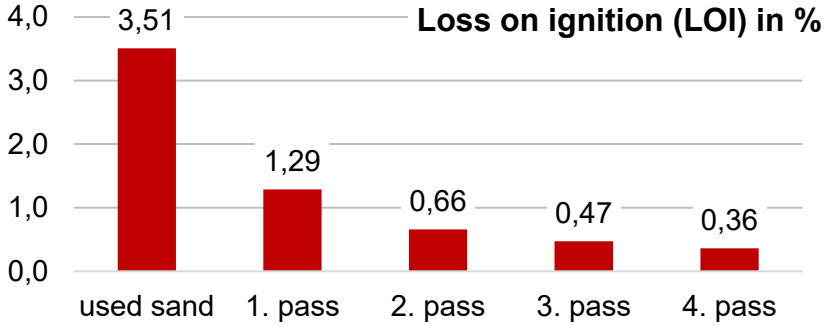
2. pass

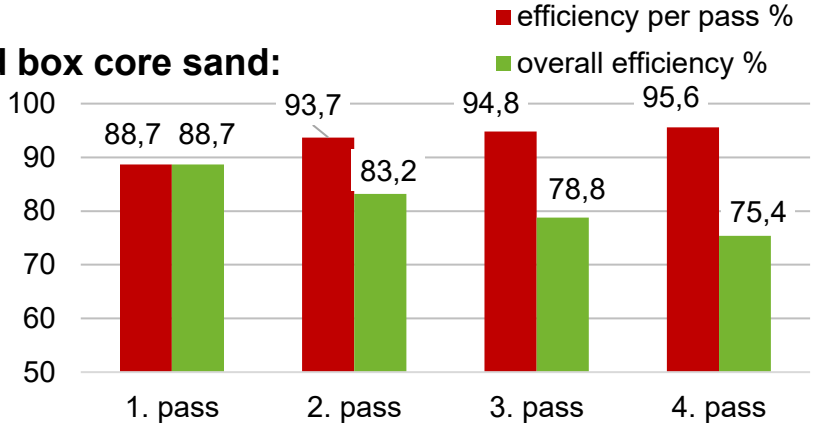
3. pass

4. pass

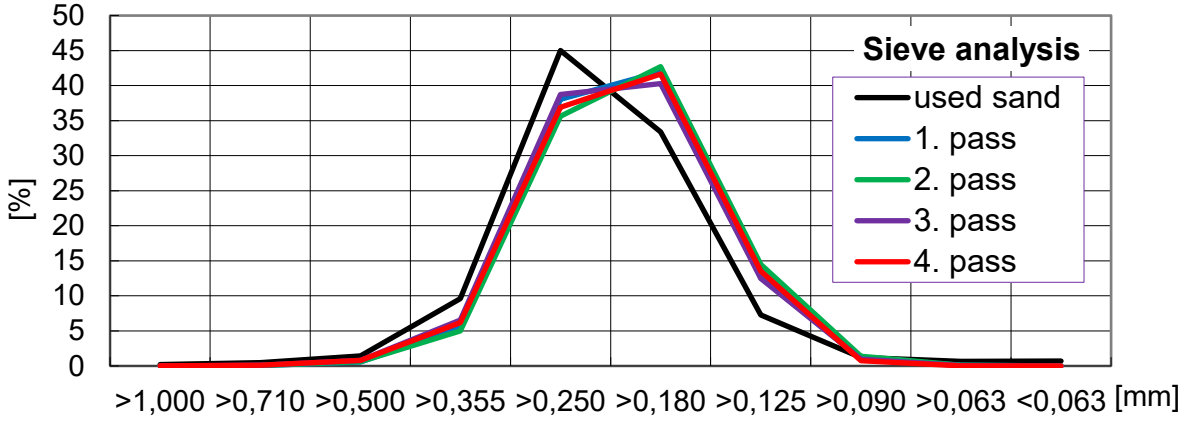
Mechanical Sand Reclaimer USR - II

Example 1 – green sand foundry with 10-20% cold box core sand:





Fitting result for customer after three passes.



Mechanical Sand Reclaimer USR - II

Example 2 – green sand foundry with <10% cold box core sand:

Sand-analysis	AFS	average grain size mm	moisture
used sand	52	0,310 mm	-
1. pass	53	0,285 mm	0,19 %
2. pass	54	0,280 mm	0,07 %
3. pass	60	0,260 mm	0,02 %
dedusted	52	0,285 mm	0,02 %

Used sand

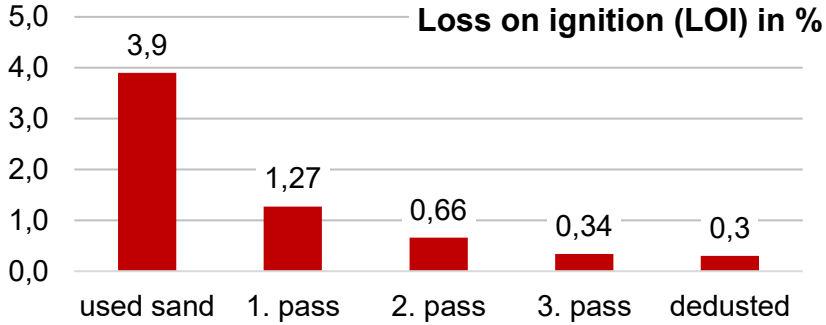
1. pass

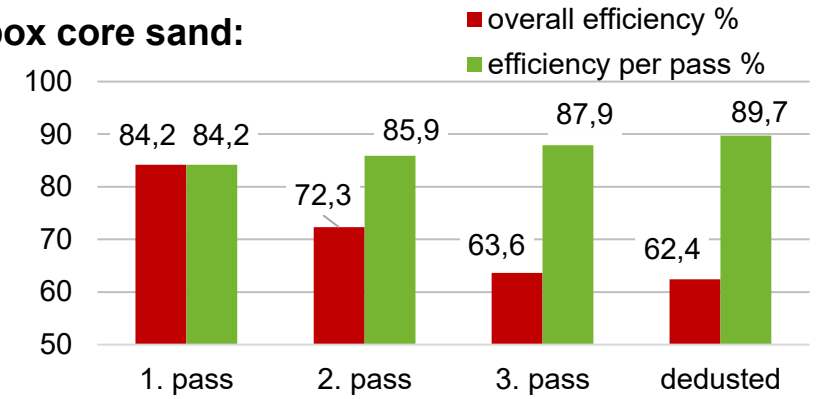
2. pass

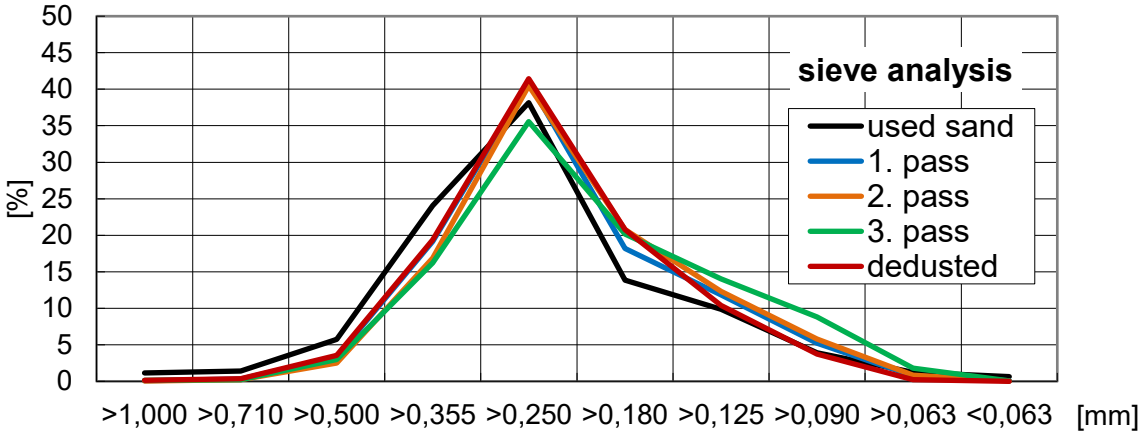
3. pass

Mechanical Sand Reclaimer USR - II

Example 2 – green sand foundry with <10% cold box core sand:







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weso

WESO key figures 2021

+ Turnover: 77,7 million EUR
+ Employees: 457
+ Output: 33,000 tons of castings

Mechanical Sand Reclaimer USR - II

core production

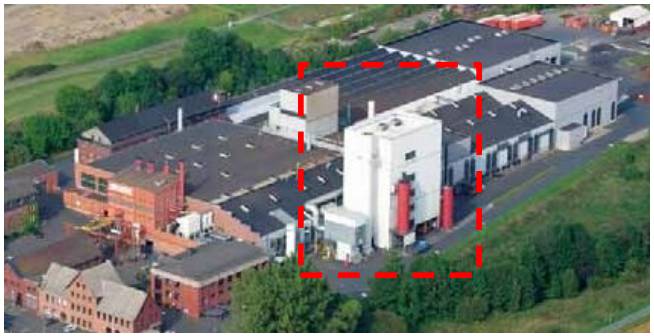
core shooting machines
- 6x Cold Box, 4x Laempe, 2x DISA CORE
- 1x WarmBox (no use of regenerate)

core sand throughput
- about 8000 tons per year
- 1 USR-II unit 1,5to/h

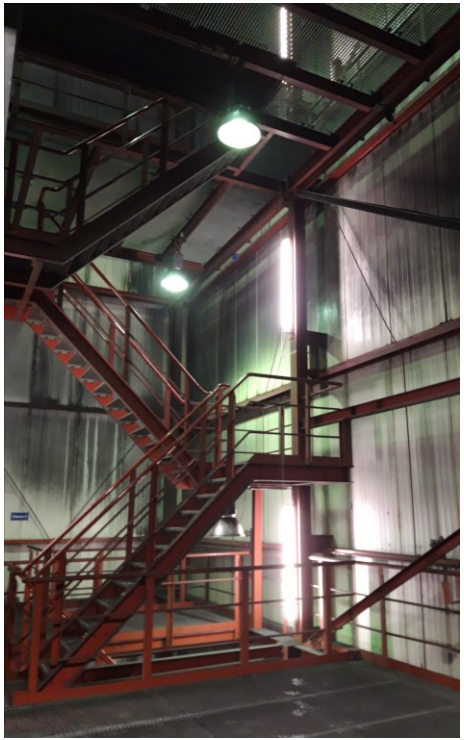
binder and amine content
- binder content: part 1 and part 2 each 0,65 %
- amine content: 1 ml/kg sand

additive
- partial use of VEINO 028 FW 1
- no change in additives during core production

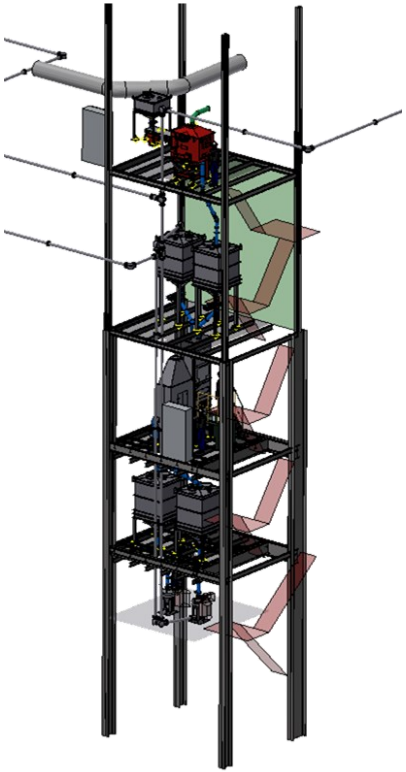
Mechanical Sand Reclaimer USR - II



Picture inside Sand preparation tower (machine area)



3D Plant Design



- Start Assembly: 04. October 2021
- Commissioning: End of October 2021

- **special local requirements:**
  - tower construction for the plant
  - planned into existing sand preparation
  - 3 different receiving points for reclaimed material dependent on the customer process

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General Information

foundry

- Production 13.000 to Castings
- Between 5 and 200kg EN-GJL

Core shop

- 4x Cold Box Core Machines
- Weight up to 120kg

- 1 USR-II unit 1,5to/h

Mechanical Sand Reclaimer USR - II

Core Production

binder and amine content

- binder content: part 1 and part 2 each 0,8 %

Relation of Reclaimed Sand

- 50% Reclaimed Sand / 50% New Sand actual
- For more complex parts lower

Mechanical Sand Reclaimer USR - II

KOVISLIVARNA

Picture inside Sand preparation tower (machine area)

- Start Assembly: September 2024
- Commissioning: End October 2024

- **special local requirements:**
  - tower construction for the plant
  - planned into existing foundry
  - Including sand drying and separating from OMEGA SINTO

Mechanical Sand Reclaimer USR - II

Conclusion – Sand: A Finite Geological Resource

Sand forms over geological timescales — from the weathering of rocks, through transport and deposition, a process taking **hundreds of thousands to millions of years**.
Despite this, humanity extracts **40–50 billion tons per year**, far exceeding natural regeneration.
Sand is not renewable within any human or industrial timeframe.
The growing demand driven by **urbanization, infrastructure, and industry** is creating a *hidden global resource crisis*.
Sustainable management requires:

- Recognizing sand as a **strategic, limited material**
- Promoting **recycling, substitution, and circular economy models**
- Implementing **governance and monitoring** on national and international levels

If we act now, we can balance human development with nature's ability to regenerate.

Mechanical Sand Reclaimer USR - II

Thank you very much for your attention!