With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

Green Casting LIFE
(LIFE21-ENV-FI-101074439)

❑ **Sand reclamation**

Final Seminar: Sustainable Solutions for Foundries

Michal Vykoukal, SAND TEAM

Teams meeting, 29.1.2026

RECLAMATION

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

SAND RECLAMATION

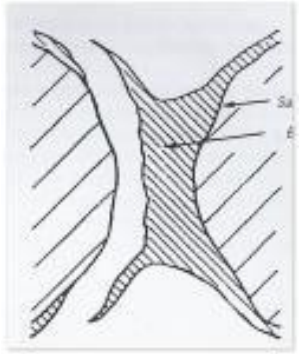
SAND TEAM

RECLAMATION

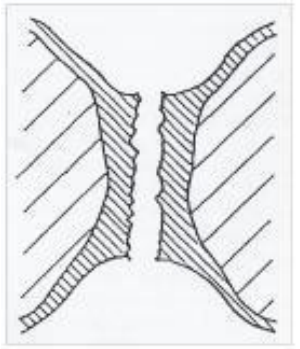
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

- We want to reuse sand back for mould and core production as much as possible as and save the resources of new sand.
  - … and safe money as well.
- If we want to reuse a high percentage of reclaimed sand, we need to clean the sand grains well of contaminants.
  - binder and hardener residuals, dust, water.
  - … and remove these undesirable residuals from the sand !!!
- The bonding envelope is cohesively or adhesively bonded to the abrasive grain.



Adhesive destruction of the binding bridge



Cohesive destruction of the binding bridge

- Destruction of the binding bridge:
  - Cohesive destruction → water glass, sodium silicate.
  - Adhesive destruction → geopolymers:
    - Better colapsibility.
    - Better reclaimability.
    - In some cases of lower strength.

SAND TEAM

RECLAMATION

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

Types of reclamations

- Primary reclamation
  - Mechanical attrition
  - Sand drying
- Secondary reclamation
  - Primary mechanical attrition
  - Sand drying
  - Secondary mechanical attrition

Used sand

- Used sand after pouring has:
  - up to 1% moisture (1,8% of binder in sand mixture).
  - Up to 1,5% moisture (3,0% of binder in sand mixture).
  - Such a wet used sand mixture is no longer completely free-flowing and could cause blocking shakeout deck, conveying/transport problems and bridging of the sand hoppers.
- Solution:
  - Sand drying before primary attrition.
  - Temperature from 100 to 130 °C.

SAND TEAM

RECLAMATION

Primary reclamation 70%

- Up to 70% reclaimed sand
- 30% new sand
- Moisture content must be taken into account:
  - Sand drier … yes / not?

GEOPOL®

Shakeout of mould, primary reclamation, external deck

SAND TEAM

An alternative solution for primary reclamation for large and heavier castings is an external shake out deck 4000 x 4000 mm with maximum loading 20 tons which is followed by a hopper, vibratory feeder (3000 x 1000 mm), magnetic separator (20 tph), crusher BD20 (20 tph), optionally cooler G20 and sand conveying pressure vessel DP330 for conveying primary reclaimed sand to the hopper for primary reclaimed sand.

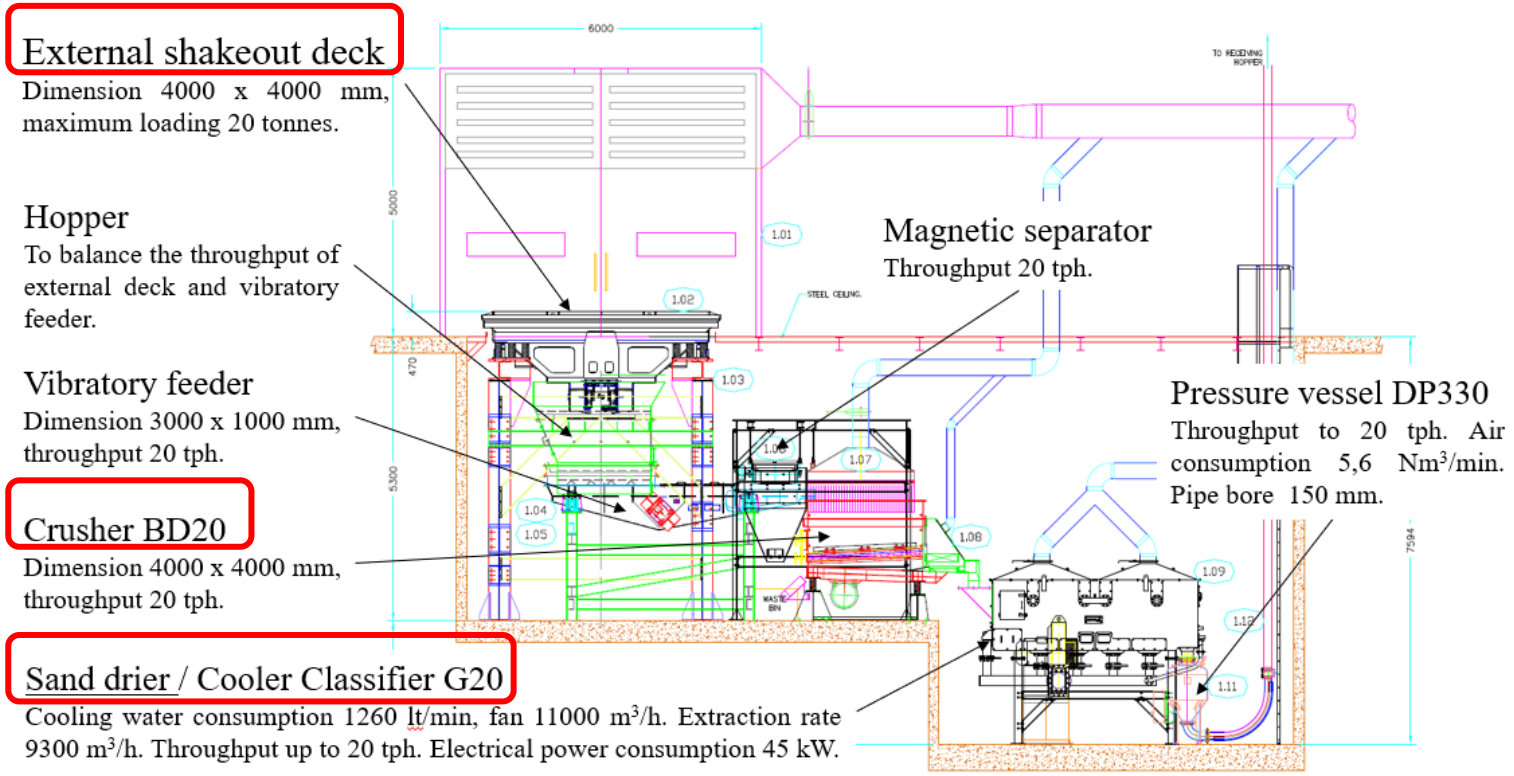
External shakeout deck
Dimension 4000 x 4000 mm, maximum loading 20 tonnes.

Hopper
To balance the throughput of external deck and vibratory feeder.

Vibratory feeder
Dimension 3000 x 1000 mm, throughput 20 tph.

Crusher BD20
Dimension 4000 x 4000 mm, throughput 20 tph.

Sand drier / Cooler Classifier G20
Cooling water consumption 1260 lt/min, fan 11000 m³/h. Extraction rate 9300 m³/h. Throughput up to 20 tph. Electrical power consumption 45 kW.



SAND TEAM

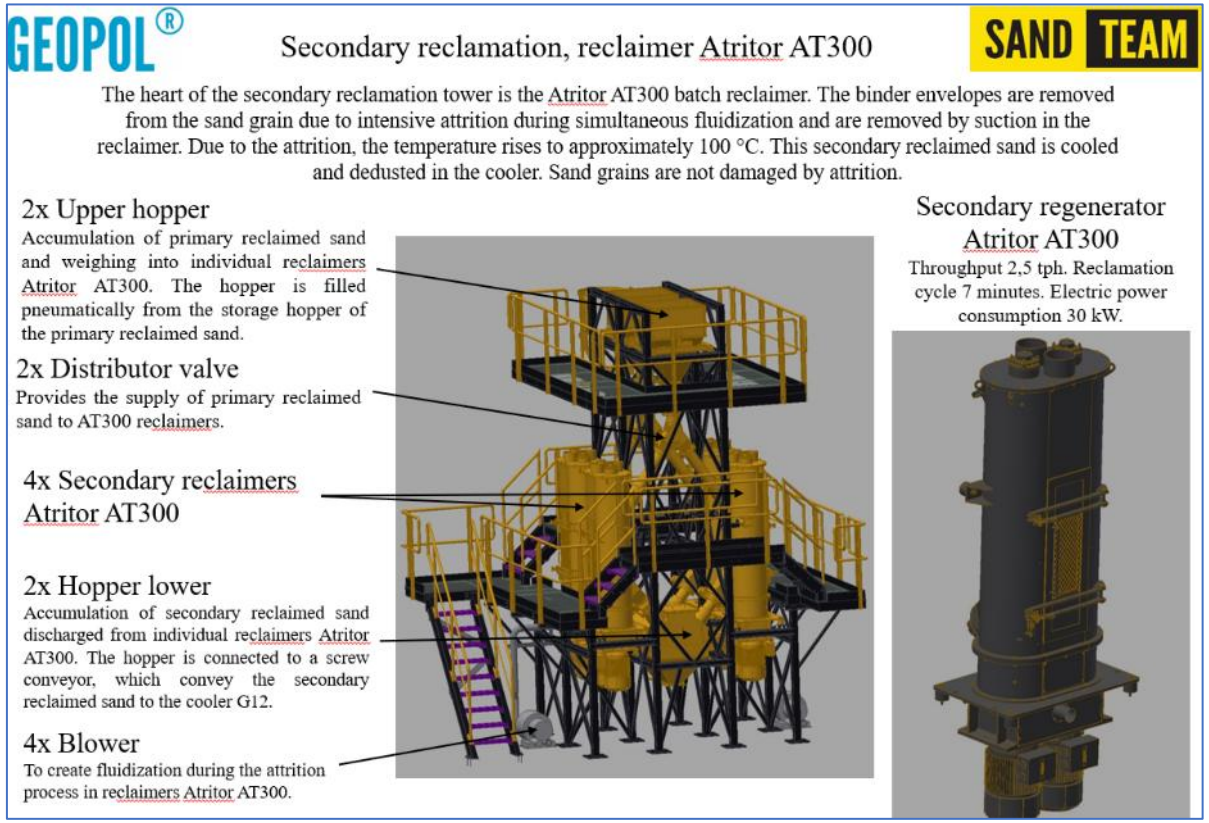
RECLAMATION

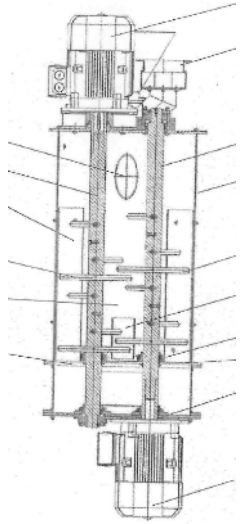
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

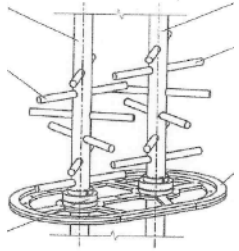
GREENCASTING

Secondary reclamation up to 90% (10% new sand)

- USR – Omega commercial solution
- AT – batch type reclaimer for small quantities and for testing







SAND TEAM

RECLAMATION

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

- AT secondary reclamation up to 90% (10% new sand)
  - Sand is mechanically processed and temperature rises up to 100 °C.
  - The foundry producing moulds and cores with 90% of reclaimed sand and 10% of new sand.
  - Binder GEOPOL 618 addition level is from 1,6% (moulds) to 1,8% (cores)
  - Hardener SA or GEOFIX series with addition of 15% based on binder.
  - Flexural strengths (90% reclaim/ 10% new sand):
  - 0,5 to 0,7 MPa after 1 hoor
  - 1,0 to 1,1 MPa after 4 hours
  - 1,4 to 1,8 MPa after 24 hours

✓ It is effective mechanical secondary reclamation, where the binder system envelopes are intensively attrited/scrubbed from the sand grain and then removed from sand by suction.

✓ Despite of the high attrition efficiency, the amount of dust removed throughout the primary and secondary reclamation ranges from <u>3.5 to 5%!</u>

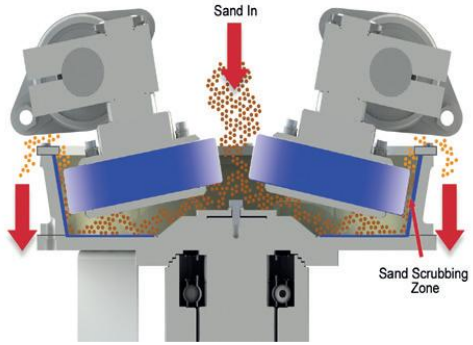
SAND TEAM

RECLAMATION

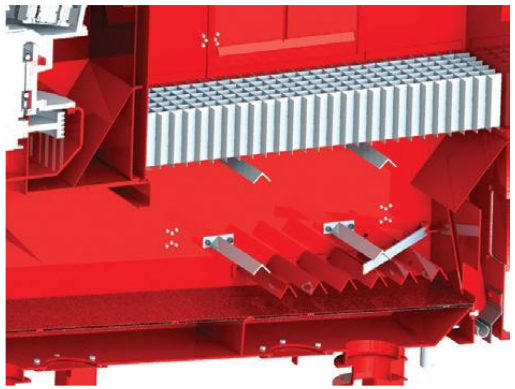
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

- USR secondary reclamation up to 90%
  - For effective removal of binder residues from sand grains.
  - Attrition with ceramic pressure discs.
  - For organic and inorganic systems.



Ceramic rollers with high durability



Fluid bed with dust extraction

SAND TEAM

RECLAMATION

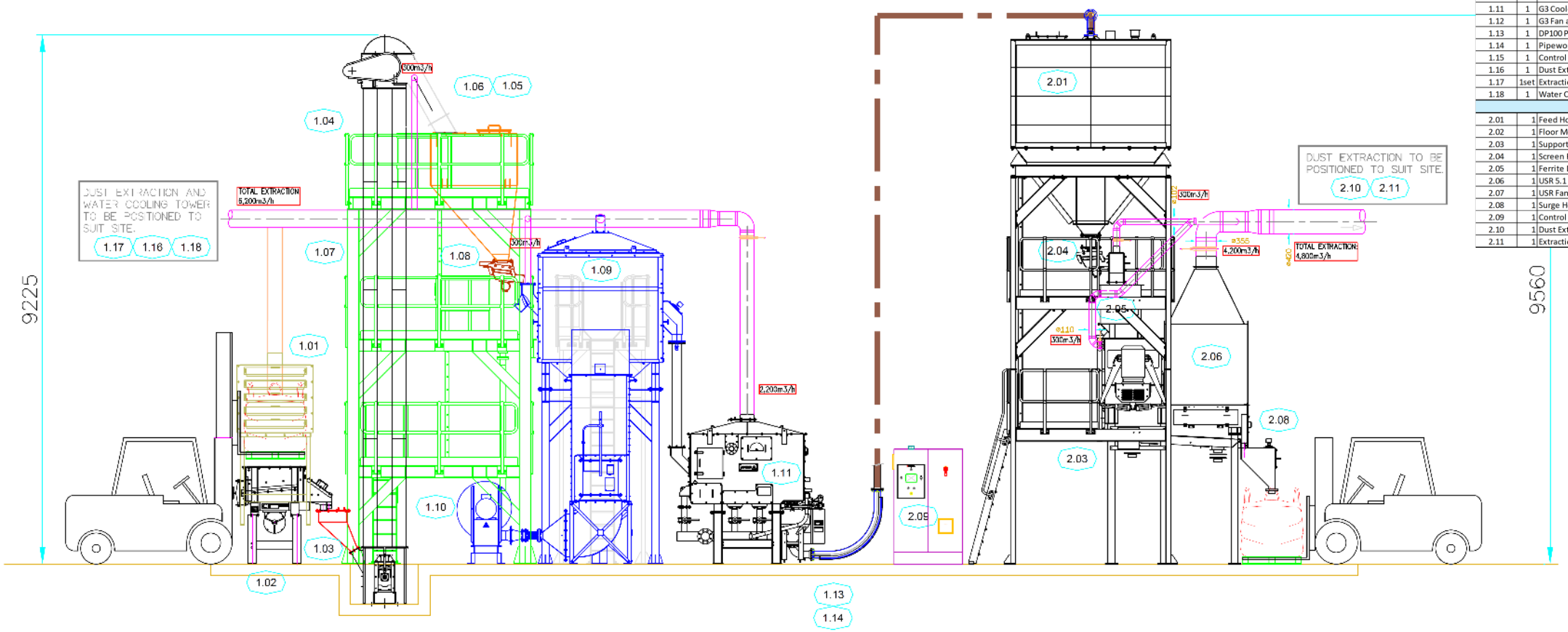
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

USR secondary reclamation up to 90%

- USR

C3522		SAND TEAM - CZECH	06.01.25
Item	Qty	Description	Supplier
		Section 1 - Sand Conditioning	
1.01	1	BD5 Dust Hood;	LOCAL
1.02	1	BD5 Attrition Unit;	OMEGA
1.03	1	Bucket Elevator Inlet Chute;	LOCAL
1.04	1	5tph Bucket Elevator;	LOCAL
1.05	1	High Level Probe;	LOCAL
1.06	1	Feed Hopper; 5tonne	LOCAL
1.07	1	Support Structure	OMEGA
1.08	1	Pan Feeder with Pneumatic Gate	OMEGA
1.09	1	Sand Drier; Model 5	OMEGA
1.10	1	Fan Silencer for Sand Drier	OMEGA
1.11	1	G3 Cooler Classifier	OMEGA
1.12	1	G3 Fan and Silencer	OMEGA
1.13	1	DP100 Pressure Vessel (PV Control Panel, Feeding 1x Hopper); 100mm	OMEGA
1.14	1	Pipework & Bends; 100mm	LOCAL
1.15	1	Control Panel	OMEGA
1.16	1	Dust Extraction Unit; 7,735m3/hr	LOCAL
1.17	1set	Extraction Ductwork;	LOCAL
1.18	1	Water Cooling Tower (Adiabatic); 252ltr/min	LOCAL
		Section 2 - USR 5.1 Secondary Attrition	
2.01	1	Feed Hopper; 20tonnes	LOCAL
2.02	1	Floor Mounted Vent Unit; 40m2	LOCAL
2.03	1	Support Structure and Access Platform	LOCAL
2.04	1	Screen Feeder; 5tph	OMEGA
2.05	1	Ferrite Drum Magnetic Separator; 5 tph	OMEGA
2.06	1	USR 5.1	OMEGA
2.07	1	USR Fan Silencer	OMEGA
2.08	1	Surge Hopper	LOCAL
2.09	1	Control Panel; USR	OMEGA
2.10	1	Dust Extraction Unit; 4,800m3/hr	OMEGA
2.11	1	Extraction Ductwork;	LOCAL



SAND TEAM

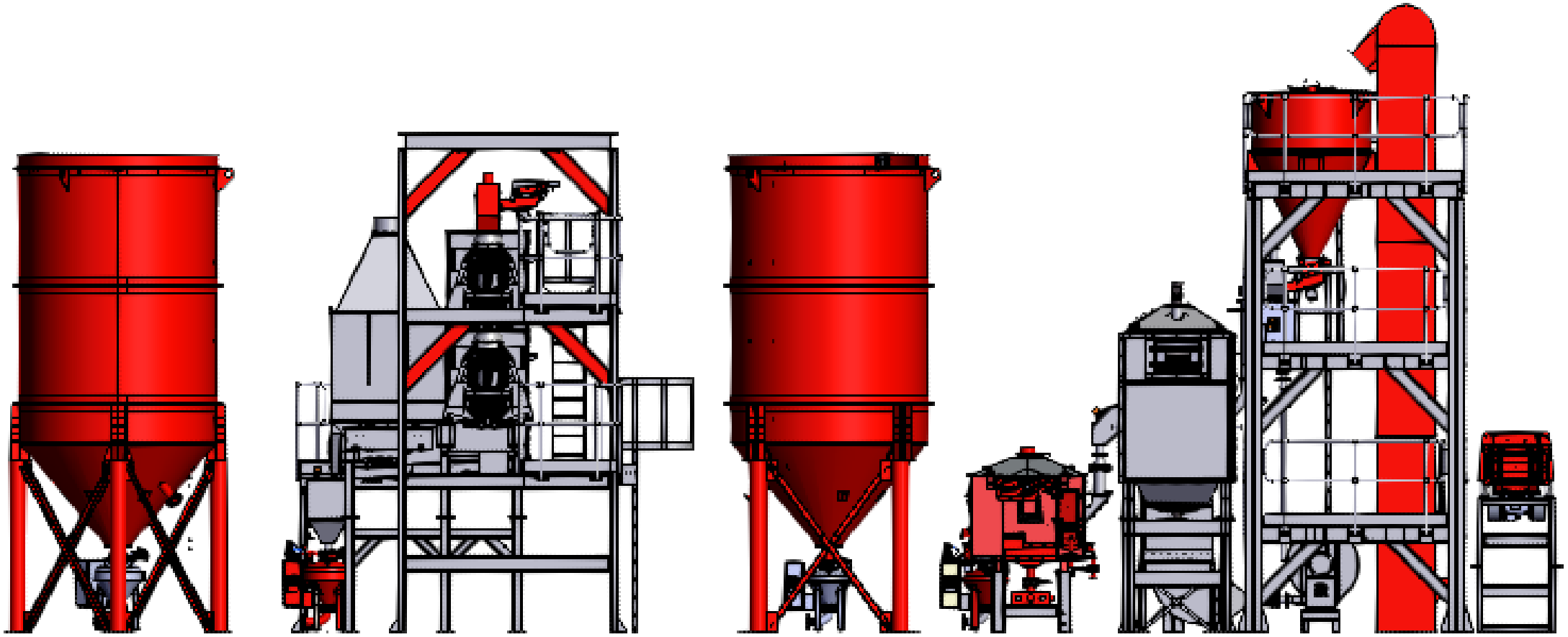
RECLAMATION

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

USR secondary reclamation up to 90%

- USR reclamation schema.



SAND TEAM

RECLAMATION

- Reclaimed sand parameters

  - For mould and core production with 90% o reclaimed sand + 10% new sand.
  - The most important parameters and recommended / max levels:

Parameter	Value
Average grain size (d_{50}), mm	**± 10%**
Parts below 0,09 mm, %	**max 0,40**
Washable substances, %	**max 1,25**
Moisture, %	**max 0,25**
Bound water, %	0,7
LOI, %	0,7
Na_2O content, 10^{-3}	**max 300**
pH value, -	about 10,5 ± 5%
Conductivity, µS/cm	**max 500**

RECLAMATION

Sand mixture with reclaimed sand

1,8 % GEOPOL 618 + 18 % GEOFIX 03 + 90% reclaimed/ 10% new sand

Flexural strength, MPa		
1 hod.	4 hours	24 hours
0,5 to 0,7	**1,0 to 1,1**	**1,4 to 1,8**

Bench life	Stripping time
5 to 10 minutes	**15 to 30 minutes**

RECLAMATION

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439
GREENCASTING

- Reclamation results – USR reclamation tests

Sand Analysis Report

sinto OMEGA www.ofml.net

Omega Sinto Foundry Machinery ltd.
Morley Way, Woodston Peterborough. PE2 7BW
Tel:+ 44 (0)1733 232231 Fax: +44 (0)1733 237012

CUSTOMER: Sand Team Ref 4636 Bag 1 SAMPLE DATE: 20/08/2024
CUSTOMER CONTACT: SAND TYPE: Silica/Geopol
OMEGA REPRESENTATIVE: S Garner PROCESS TYPE : USRx2

	As Arrived	Post BD	USR Pass 1	USR Pass 2	
AFS	50.28	48.36	46.23	44.30	#DIV/0!
Moisture	0.52%	0.48%	0.26%	0.26%	#DIV/0!
LOI	0.00%	0.00%	0.00%	0.00%	#DIV/0!
pH	10.14	10.20	10.21	10.24	0.00
Conductivity	1310µS	1270µS	690µS	530µS	µS
Sand as arrived	1037kg				
Sand			966kg	948kg	
Dust			14kg 1.34%	20kg 1.97% Total Dust 34kg	Total3.34%

Sand Analysis Report

sinto OMEGA www.ofml.net

Omega Sinto Foundry Machinery ltd.
Morley Way, Woodston Peterborough. PE2 7BW
Tel:+ 44 (0)1733 232231 Fax: +44 (0)1733 237012

CUSTOMER: Sand Team Ref 4637 Bag 2 SAMPLE DATE: 20/08/2024
CUSTOMER CONTACT: SAND TYPE: Silica/Geopol
OMEGA REPRESENTATIVE: S.Garner PROCESS TYPE : USRx2

	As Arrived	Post BD	USR Pass 1	USR Pass 2	
AFS	51.28	53.53	47.54	48.62	#DIV/0!
Moisture	0.73%	0.77%	0.47%	0.28%	#DIV/0!
LOI	0.00%	0.00%	0.00%	0.00%	#DIV/0!
pH	10.07	10.28	10.28	10.44	0.00
Conductivity	Over RangeµS	Over RangeµS	1300µS	950µS	µS
Sand as arrived	770kg				
Sand			650kg	577kg	
Dust			83kg 10%	72kg 9.3% Total Dust 155kg	Total 20%

Sand Analysis Report

sinto OMEGA www.ofml.net

Omega Sinto Foundry Machinery ltd.
Morley Way, Woodston Peterborough. PE2 7BW
Tel:+ 44 (0)1733 232231 Fax: +44 (0)1733 237012

CUSTOMER: Sand Team Ref 4635 Bag 3 SAMPLE DATE: 20/08/2024
CUSTOMER CONTACT: SAND TYPE: Silica/Geopol
OMEGA REPRESENTATIVE: S Garner PROCESS TYPE : USRx2

	As Arrived	Post BD	USR Pass 1	USR Pass 2	Post Thermal (Not Post Chromite Separation)
AFS	39.71	40.95	42.01	38.93	#DIV/0!
Moisture	0.49%	0.34%	0.45%	0.38%	#DIV/0!
LOI	0.00%	0.00%	0.00%	0.00%	#DIV/0!
pH	10.41	10.78	10.86	10.51	0.00
Conductivity	Over RangeµS	Over RangeµS	1710µS	1560µS	µS
Sand as arrived	875kg				
Sand			833kg	820kg	
Dust			18kg 2%	13kg 1.4% Total dust 31kg	Total 3.5%

SAND TEAM

RECLAMATION

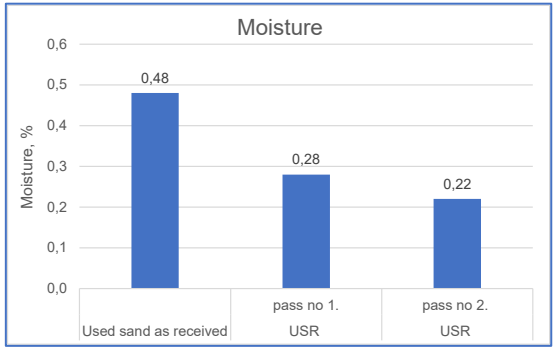
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

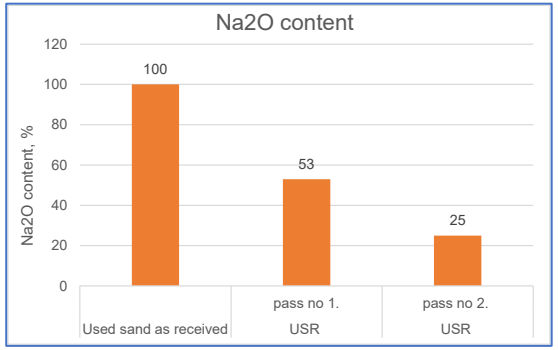
GREENCASTING

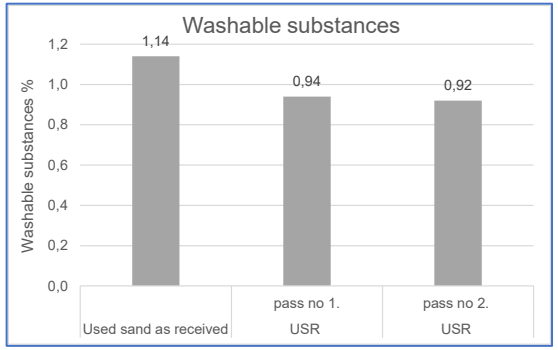
USR reclamation tests – VAG, Hodonín – Iron foundry (no reclamation, new sand)

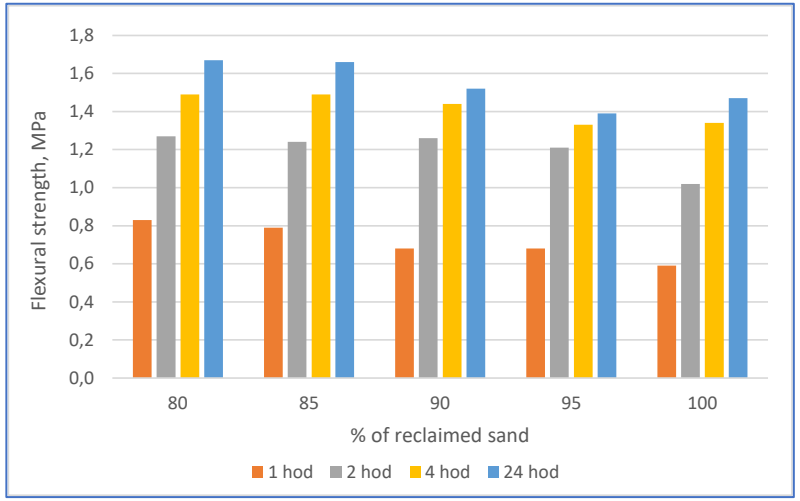
Parameter		Used sand as received	USR pass no 1.	USR pass no 2.
Moisture	%	0,48	0,28	0,22
Na_2O content	%	100	53	25
pH	-	10,19	-	-
Conductivity	µS/cm	467	129	319
Parts below 0,09 mm	%	0,42	0,02	0,04
Washable substances	%	1,14	0,94	0,92
d_{50} (Average grain size)	mm	0,26	0,30	0,29
AFS	-	53	44	47

Sand 1		Reclaimed sand 2		Binder		Hardener		Flexural strength, MPa				Bench life	Stripping time
Type	w.p.	Type	w.p.	Type	w.p.	Type	%	1 h	2 h	4 h	24 h	min	
SH 33 VAG	20	Reclaimed sand USR	80	Geopol 618	1,80	GF 00	18	0,83	1,27	1,49	1,67	9	23
SH 33 VAG	15	Reclaimed sand USR	85	Geopol 618	1,80	GF 00	18	0,79	1,24	1,49	1,66	8	22
SH 33 VAG	10	Reclaimed sand USR	90	Geopol 618	1,80	GF 00	18	0,68	1,26	1,44	1,52	6	22
SH 33 VAG	5	Reclaimed sand USR	95	Geopol 618	1,80	GF 00	18	0,68	1,21	1,33	1,39	7	23
SH 33 VAG	0	Reclaimed sand USR	100	Geopol 618	1,80	GF 00	18	0,59	1,02	1,34	1,47	6	20









The use of reclaimed sand is possible up to 100%.

- ✓ Bench life is sufficient when using hardener GF 00, stripping time 20-23 minutes.
- ✓ The resulting strengths are in the range of 1.4 to 1.7 MPa, which is satisfactory.

SAND TEAM

RECLAMATION

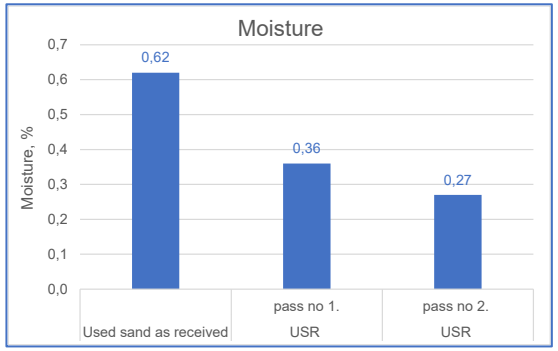
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

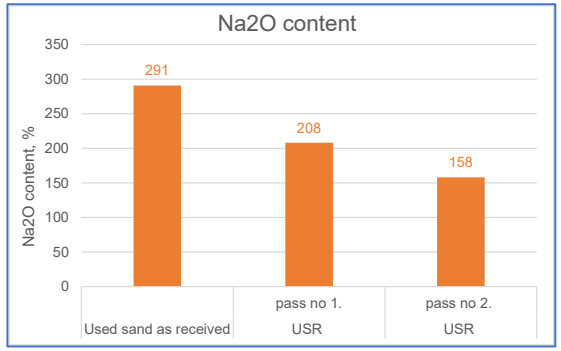
GREENCASTING

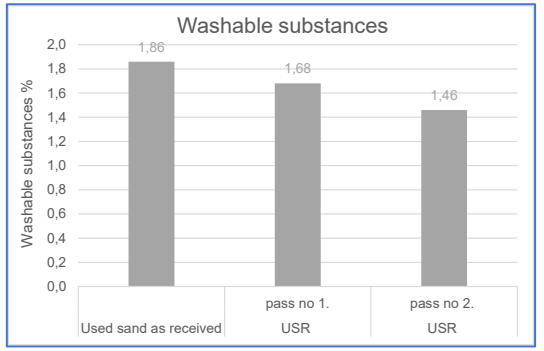
USR reclamation tests – Unitherm – Aluminium foundry (secondary reclamation, reclaimed sand)

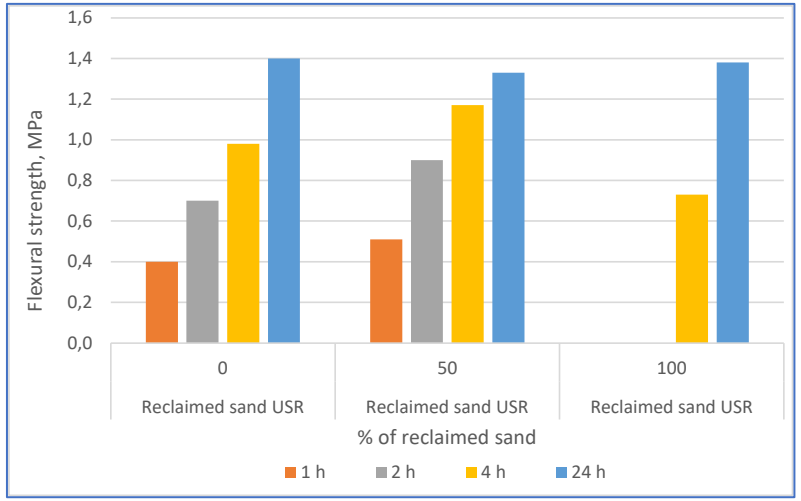
		Used sand as received	USR pass no 1.	USR pass no 2.
Moisture	%	0,62	0,36	0,27
Na_2O content	%	291	208	158
pH	-	10,32	9,48	8,53
Conductivity	µS/cm	816	508	348
Parts below 0,09 mm	%	0,79	0,22	0,04
Washable substances	%	1,86	1,68	1,46
d_{50} (Average grain size)	mm	0,27	0,27	0,28
AFS	-	53	52	50

Sand 1		Reclaimed sand 2		Binder		Hardener		Flexural strength, MPa				Bench life	Stripping time
Type	w.p.	Type	w.p.	Type	w.p.	Type	%	1 h	2 h	4 h	24 h	min	
ST 53	100	Reclaimed sand USR	0	Geopol 618	1,80	SA 73	15	0,40	0,70	0,98	1,40	18	40
ST 53	50	Reclaimed sand USR	50	Geopol 618	1,80	SA 73	15	0,51	0,90	1,17	1,33	13	43
ST 53	0	Reclaimed sand USR	100	Geopol 618	1,80	SA 71	15	0,00	0,00	0,73	1,38	57	178









It is possible to use up to 100% of reclaimed sand.

- ✓ Bench life /stripping time can be set by mixing of slow and fast hardener.
- ✓ The resulting strengths are in the range of 1.3 to 1.4 MPa, which is satisfactory.

SAND TEAM

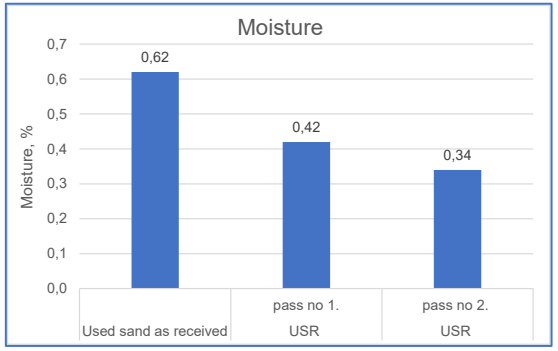
RECLAMATION

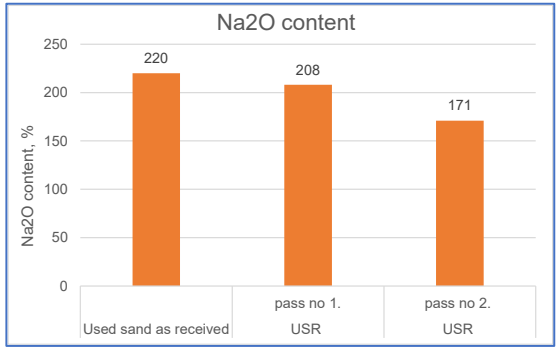
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439
GREENCASTING

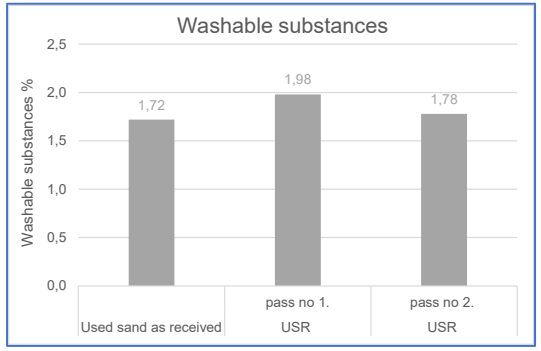
USR reclamation tests – Nové Město – Iron Foundry (primary reclamation, reclaimed sand)

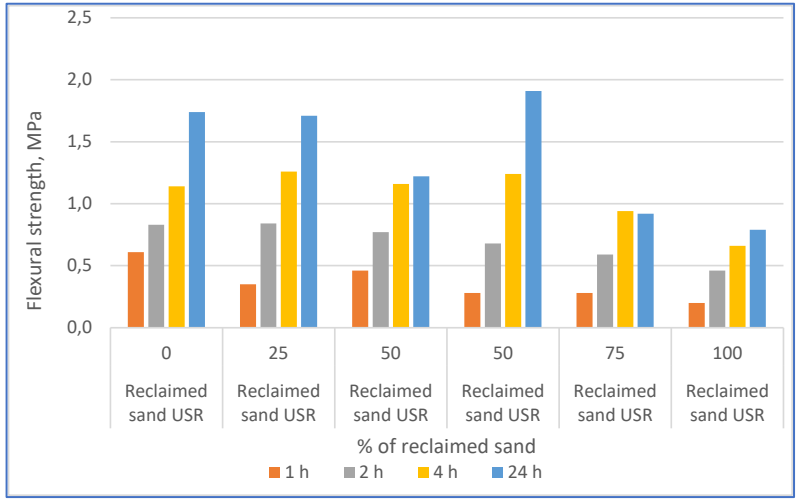
Parameter		Used sand as received	USR pass no 1.	USR pass no 2.
Moisture	%	0,19	0,42	0,34
Na_2O content	%	220	T=208	171
pH	-	10,35	9,54	9,09
Conductivity	µS/cm	866	627	503
Parts below 0,09 mm	%	0,12	0,08	0,06
Washable substances	%	1,72	1,98	1,78
d_{50} (Average grain size)	mm	0,33	0,32	0,35
AFS	-	40	43	38

Sand 1		Reclaimed sand 2		Binder		Hardener		Flexural strength, MPa				Bench life	Stripping time
Type	w.p.	Type	w.p.	Type	w.p.	Type	%	1 h	2 h	4 h	24 h	min	
SH 32	100	Reclaimed sand USR	0	Geopol 618	1,80	SA 73	15	0,61	0,83	1,14	1,74	19	40
SH 32	75	Reclaimed sand USR	25	Geopol 618	1,80	SA 73	15	0,35	0,84	1,26	1,71	21	74
SH 32	50	Reclaimed sand USR	50	Geopol 618	1,80	SA 73	15	0,46	0,77	1,16	1,22	0	35
SH 32	50	Reclaimed sand USR	50	Geopol 618	1,80	SA 71	15	0,28	0,68	1,24	1,91	19	69
SH 32	25	Reclaimed sand USR	75	Geopol 618	1,80	SA 71	15	0,28	0,59	0,94	0,92	8	60
SH 32	0	Reclaimed sand USR	100	Geopol 618	1,80	SA 71	15	0,20	0,46	0,66	0,79	0	92









It is possible to use about 50% of reclaimed sand.

- ✓ Bench life /stripping time can be set by mixing of slow and fast hardener.
- ✓ The resulting strengths are around 1,7 MPa.
- ✓ Sand mixtures with 50% of reclaimed sand have low strength and short bench life.

SAND TEAM

RECLAMATION – Pilot foundries

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

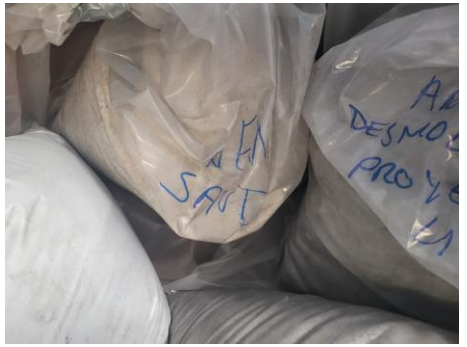
GREENCASTING

- Reclamation results – reclamation of used sand from pilot foundries
- Tests were carried out at SAND TEAM:
  - Primary reclamation.
  - Secondary reclamation.

- 8 samples of used sand after casting:
  - **METAMSA** – Foseco
  - **PEIRON**
    - GEOPOL
    - PEAK
    - Foseco
  - **Valumehaanika**
    - GEOPOL
  - **OPSA**
    - PEAK
    - GEOPOL
  - **JEZ**
    - GEOPOL

Sand mixtures made from **reclaimed sand**, **several cycles** in the foundry METAMSA (moulding, casting, reclamation)

Sand mixtures made from **new sand**, **first cycle** (moulding, casting, reclamation)



FA Assisi – core production and evaluation of the effect on green sand mixtures.

SAND TEAM

RECLAMATION – Pilot foundries

Laboratory reclamation tests carried out at SAND TEAM

Overview of work and tests: Reclamation – Sand mixtures – Waste sand classification

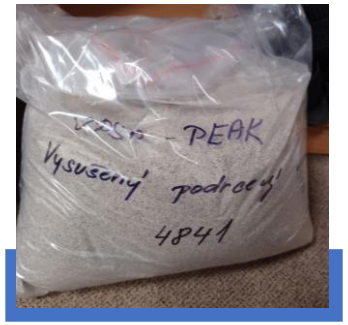
- Primary reclamation
- Secondary reclamation
- New sand, used sand parameters
- Primary reclaimed sand parameters
- Secondary reclaimed sand parameters
- Sand mixtures with primary reclaimed sand
- Sand mixtures with secondary reclaimed sand
- Used sand waste classification
- Individual parameter of primary and secondary reclaimed sand for sand waste classification

RECLAMATION – Pilot foundries

Laboratory reclamation tests carried out at SAND TEAM

- Tested parameters of primary and secondary reclaimed sand.

- Main reclaimed sand parameters:
  - ✓ Na_2O content (%Na_2O),
  - ✓ Washable substances, (%),
  - ✓ Electrical conductivity (μS/cm),
  - ✓ Parts below 0,09 mm (%),
  - ✓ Moisture (%).



Example of sand ready for testing

- Other additional parameters:
  - d_{50} (mm),
  - AFS (-),
  - Bond water (%),
  - LOI (%),
  - pH (-),
  - ADV7 (ml).

Conductivity and pH meter

Na_2O content measuring apparatus

Sieve analysis, d_{50}, AFS, Parts below 0,09 mm

Stirers for Washable substances, Sieve analysis

Drying oven for Moisture content and preparing sand samples, …

Muffle furnaces for LOI, Bond water determination, …

RECLAMATION – Pilot foundries

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

Laboratory sand mixtures with primary and secondary reclaimed sand carried out at SAND TEAM

- Strength and bench life of sand mixtures measuring
  - Bench life and stripping time.
  - Flexural strength after 1, 2, 4 and 24 hours.

Laboratory batch mixer

Laboratory core box for testing bars for flexural strength

Testing bars ready before flexural strength measurement.

Strength testing apparatus (flexural strength)

Mould strength tester for determining Bench life and Stripping time

SAND TEAM

RECLAMATION – Pilot foundries

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

<u>Used sand waste classification</u> – according to Czech legislation

- Used sand waste classification.
  - Analysis according to the Czech legislation by an accredited laboratory.
    - Backfilling
    - Disposal of waste at landfill S-OO3 (other waste)
    - Disposal of waste at landfill S-NO (hazardous waste)
    - Assessment of hazardous properties of waste, H14 (Ecotoxic), H15 (pH, …)

- Individual key parameters of reclaimed sand for waste classification:

  - Primary
  - Secondary

  ✓ DOC…Dissolved organic carbon
  ✓ TDS…Dissolved solids

SAND TEAM

RECLAMATION – Pilot foundries

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

Primary reclamation


- Primary reclamation (vibratory type):
  - Processing / crushing of used sand on grain size
  - Batch/continuous type crusher


  - Drying sand at 130 °C for 3 hours.
  - Chamber drying oven.

  - Reclamation and sand dust removal.
  - Atritting/ rubbing of sand grains to each other and against the shell of the vessel
  - Batch type, 10 kgs.
  - The bottom of the vessel is porous, air is blown in, the sand is fluidising, which makes it easier to remove dust by extraction
  - Processing time 30 min.

SAND TEAM

RECLAMATION – Pilot foundries

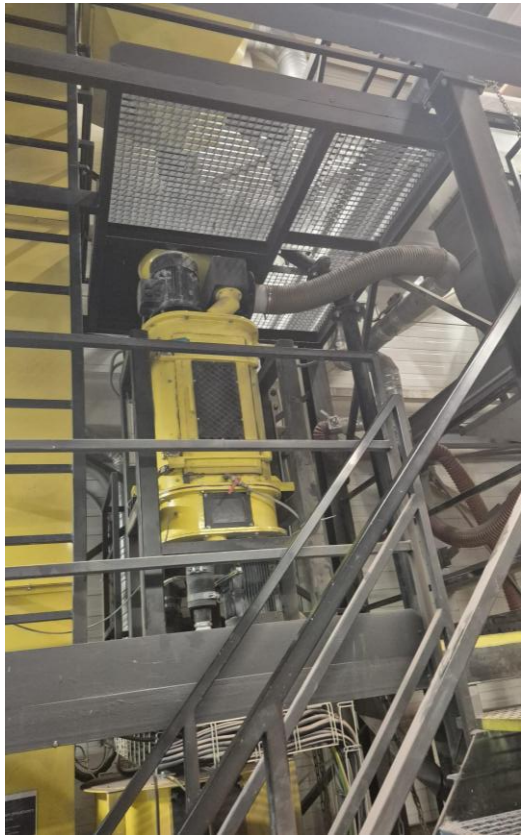
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-ES-Project 101074439

GREENCASTING

Secondary reclamation AT50

- Attrition type installed at SAND TEAM
- Laboratory type

- Sand processing and dust removal:
  - The reclaimed sand was processed at temperatures in the range of 95-120 °C.
  - The temperature will increase only by rubbing/atritting the sand in the reclamation plant (no external heating).
  - During atrition, the resulting dust particles are removed at the same time.
  - Dust particles generated by atrition (removed residues of binder, hardeners and sand) are continuously removed by suction.
  - The reclaimed sand was naturally cooled to ambient temperature



SAND TEAM

RECLAMATION – Pilot foundries

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

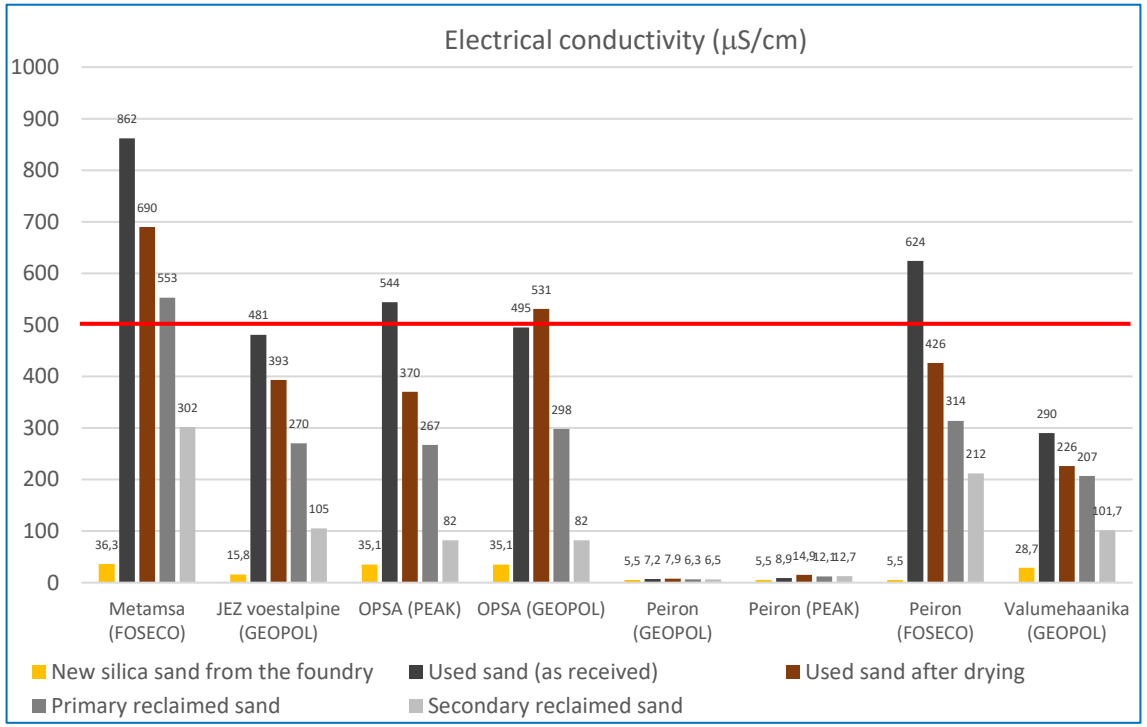
GREENCASTING

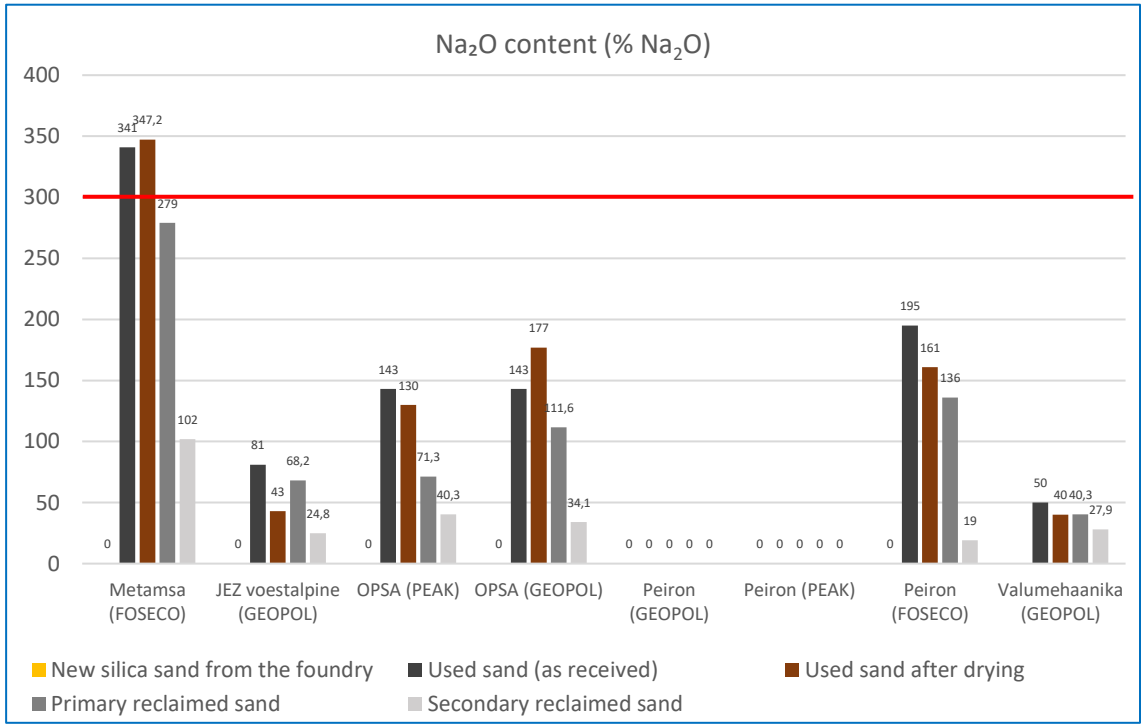
Laboratory reclamation tests carried out at SAND TEAM: Table of results

Foundry / Binder system	Type of sand	d_{50} (mm)	AFS (-)	Parts below 0,09 mm (%)	Washable substances, (%)	Moisture (%)	Bond water (%)	LOI (%)	pH (-)	Electrical conductivity (µS/cm)	ADV7 (ml)	Na_2O content (% Na_2O)
Metamsa (FOSECO)	New silica sand from the foundry	0,26	53	0,58	0,18	0,20	0,07	0,10	6,39	36,3	1,50	0,0
	Used sand (as received)	0,24	63	3,77	3,14	0,31	0,56	0,58	11,11	862,0	–	341,0
	Used sand after drying (mixed)	0,28	52	1,61	1,70	0,11	0,43	0,51	10,82	690,0	–	347,2
	Primary reclaimed sand	0,27	51	0,47	1,44	0,12	0,36	0,44	10,75	553,0	–	279,0
	Secondary reclaimed sand	0,27	50	0,20	0,76	0,04	0,24	0,30	10,38	302,0	41,79	102,0
JEZ voestalpine (GEOPOL)	New olivine (from SAND TEAM)	0,29	48	0,79	0,70	0,05	0,12	0,63	7,43	15,8	42,80	0,0
	Used sand (as received)	0,25	55	0,83	1,50	0,51	0,71	1,00	10,61	481,0	36,80	81,0
	Used sand after drying	0,27	53	1,61	1,52	0,10	0,63	0,90	9,83	393,0	40,45	43,0
	Primary reclaimed sand	0,27	52	0,38	1,12	0,18	0,44	0,94	9,99	270,0	37,10	68,2
	Secondary reclaimed sand	0,25	55	0,58	0,52	0,02	0,18	0,27	9,51	105,0	43,04	24,8
OPSA (PEAK)	New silica sand from the foundry GL27	0,23	60	0,52	0,24	0,01	0,10	0,14	6,56	35,1	1,20	0,0
	Used sand (as received)	0,24	57	1,24	1,52	0,44	0,55	0,61	10,63	544,0	45,00	143,0
	Used sand after drying	0,24	58	1,36	1,48	0,13	0,48	0,55	9,53	370,0	46,85	130,0
	Primary reclaimed sand	0,25	53	0,46	0,90	0,09	0,39	0,43	8,99	267,0	30,74	71,3
	Secondary reclaimed sand	0,25	54	0,46	0,56	0,00	0,20	0,26	8,91	82,0	11,19	40,3
OPSA (GEOPOL)	New silica sand from the foundry GL27	0,23	60	0,52	0,24	0,01	---	0,14	6,56	35,1	1,20	0,0
	Used sand (as received)	0,24	58	1,11	1,40	0,47	0,38	0,44	10,30	495,0	–	143,0
	Used sand after drying	0,24	56	1,13	1,12	0,07	0,39	0,45	10,13	531,0	–	177,0
	Primary reclaimed sand	0,25	54	0,44	0,76	0,07	0,31	0,37	9,83	298,0	40,90	111,6
	Secondary reclaimed sand	0,26	52	0,24	0,30	0,03	0,17	0,19	9,01	82,0	15,39	34,1
Peiron (GEOPOL)	New silica sand from the foundry	0,32	45	0,96	0,20	0,00	0,07	0,07	5,93	5,5	1,75	0,0
	Used sand (as received)	0,32	42	0,32	0,48	4,13	0,18	0,27	6,22	7,2	1,33	0,0
	Used sand after drying	0,32	43	0,26	0,60	0,03	0,14	0,22	5,08	7,9	1,98	0,0
	Primary reclaimed sand	0,32	42	0,11	0,56	0,05	0,13	0,21	7,37	6,3	2,43	0,0
	Secondary reclaimed sand	0,32	42	0,30	0,38	0,03	0,09	0,13	5,67	6,5	---	0,0
Peiron (PEAK)	New silica sand from the foundry	0,32	45	0,96	0,20	0,00	0,07	0,07	5,93	5,5	1,75	0,0
	Used sand (as received)	0,33	41	0,20	0,44	4,16	0,19	0,22	7,15	8,9	3,20	0,0
	Used sand after drying	0,33	40	0,14	0,42	0,05	0,11	0,17	6,67	14,9	3,20	0,0
	Primary reclaimed sand	0,32	42	0,10	0,24	0,04	0,09	0,15	4,92	12,1	3,25	0,0
	Secondary reclaimed sand	0,33	41	0,26	0,24	0,03	0,11	0,15	5,51	12,7	5,34	0,0
Peiron (FOSECO)	New silica sand from the foundry	0,32	45	0,96	0,20	0,00	0,07	0,07	5,93	5,5	1,75	0,0
	Used sand (as received)	0,30	45	0,30	1,36	0,61	0,37	0,46	10,89	624,0	–	195,0
	Used sand after drying	0,30	46	0,30	1,14	0,02	0,31	0,40	9,76	426,0	–	161,0
	Primary reclaimed sand	0,31	44	0,08	1,12	0,06	0,28	0,33	9,44	314,0	43,05	136,0
	Secondary reclaimed sand	0,30	45	0,14	0,58	0,03	0,19	0,24	10,04	212,0	26,15	19,0
Valumehaanika (GEOPOL)	New silica sand from the foundry	0,33	40	0,26	0,34	0,06	---	---	5,82	28,7	---	---
	Used sand (as received)	0,32	42	0,28	0,98	0,28	0,54	0,74	9,87	290,0	25,10	50,0
	Used sand after drying	0,33	41	0,24	0,92	0,10	0,51	0,62	7,15	226,0	26,50	40,0
	Primary reclaimed sand	0,33	40	0,20	0,90	0,09	0,48	0,59	9,91	207,0	25,30	40,3
	Secondary reclaimed sand	0,33	40	0,04	0,52	0,02	0,27	0,37	9,83	101,7	16,40	27,9

RECLAMATION – Pilot foundries

Laboratory reclamation tests carried out at SAND TEAM: Important parameters



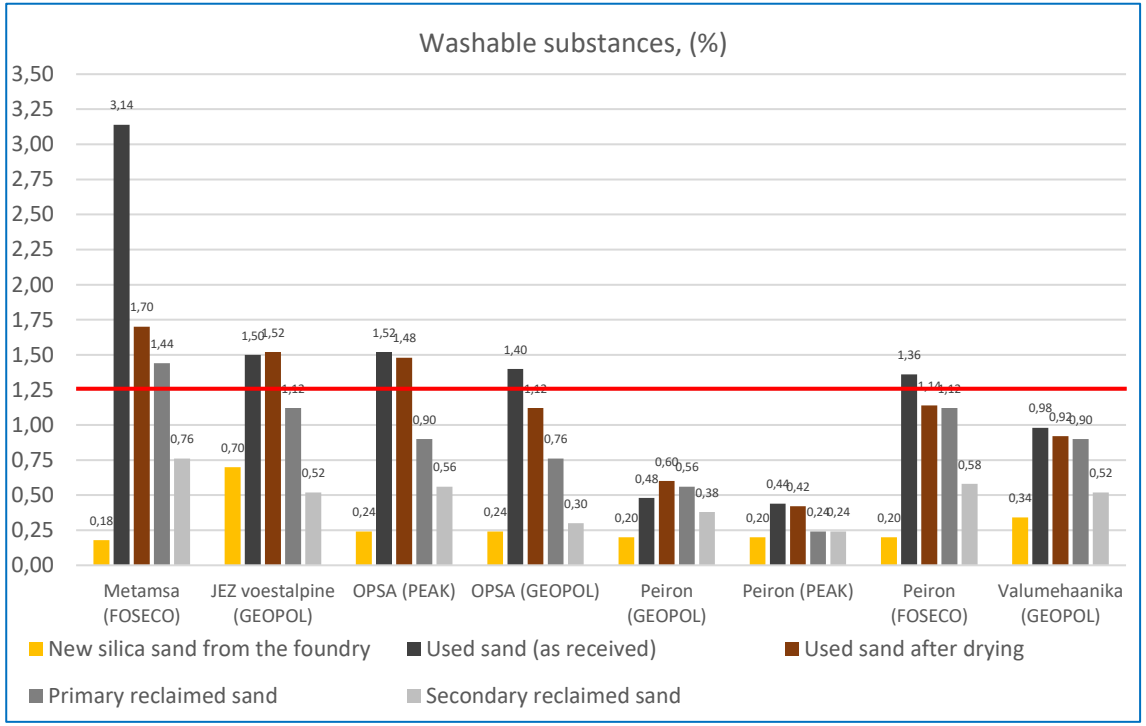


Reclamation efficiency: Electrical conductivity	Primary reclaimed sand	Secondary reclaimed sand
Metamsa (FOSECO)	35,8%	65,0%
JEZ voestalpine (GEOPOL)	43,9%	78,2%
OPSA (PEAK)	50,9%	84,9%
OPSA (GEOPOL)	39,8%	83,4%
Peiron (GEOPOL)	-	-
Peiron (PEAK)	-	-
Peiron (FOSECO)	49,7%	66,0%
Valumehaanika (GEOPOL)	28,6%	64,9%
	41,5%	73,7%

Reclamation efficiency: Na_2O content	Primary reclaimed sand	Secondary reclaimed sand
Metamsa (FOSECO)	18,2%	70,1%
JEZ voestalpine (GEOPOL)	15,8%	69,4%
OPSA (PEAK)	50,1%	71,8%
OPSA (GEOPOL)	22,0%	76,2%
Peiron (GEOPOL)	-	-
Peiron (PEAK)	-	-
Peiron (FOSECO)	30,3%	90,3%
Valumehaanika (GEOPOL)	19,4%	44,2%
	26,0%	70,3%

RECLAMATION – Pilot foundries

Laboratory reclamation tests carried out at SAND TEAM: Important parameters



Reclamation efficiency: Washable substances	Primary reclaimed sand	Secondary reclaimed sand
Metamsa (FOSECO)	54,1%	75,8%
JEZ voestalpine (GEOPOL)	25,3%	65,3%
OPSA (PEAK)	40,8%	63,2%
OPSA (GEOPOL)	45,7%	78,6%
Peiron (GEOPOL)	-	-
Peiron (PEAK)	-	-
Peiron (FOSECO)	17,6%	57,4%
Valumehaanika (GEOPOL)	8,2%	46,9%
	32,0%	64,5%

RECLAMATION – Pilot foundries

Laboratory sand mixture tests carried out at SAND TEAM: Table of results

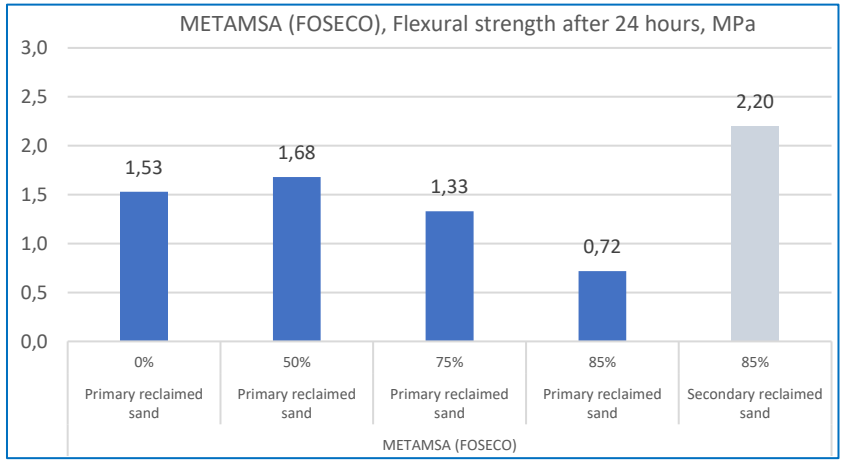
With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

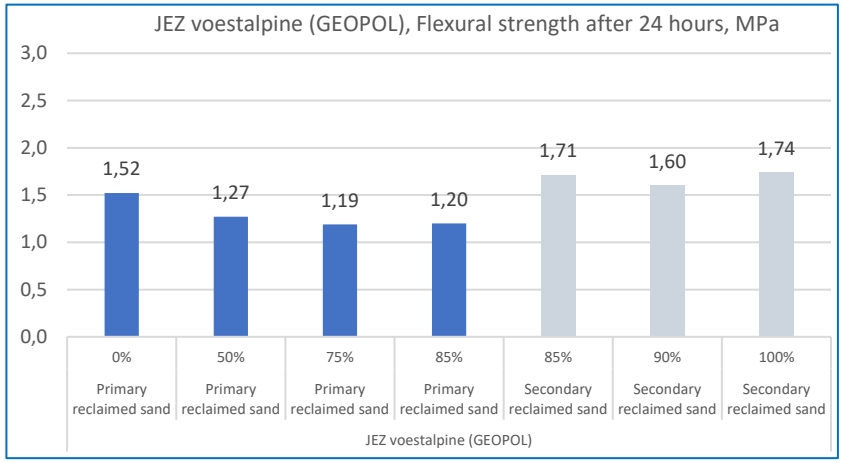
GREENCASTING

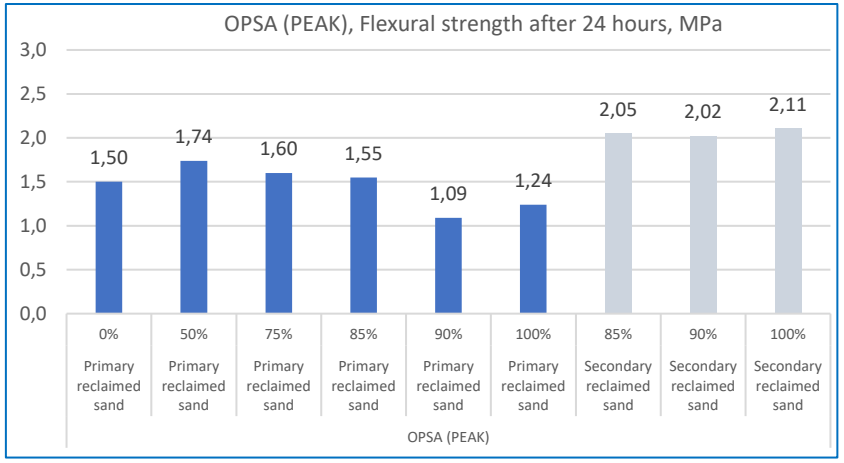
Foundry / Binder system	SAND 1: Reclaimed sand		SAND 2: New sand		Binder		Hardener		Flexural strength, Mpa				Bench life	Stripping time		Speed	Ratio
														200 kPa	350 kPa		
	Reclaimed Sand	h.d.	New sand	h.d	Binder	h.d.	Hardener	%	1 hour	2 hours	4 hours	24 hours		min		kPa/min	
METAMSA FOSECO	Primary reclaimed sand	0%	New silica sand	100%	Carsil 4000	3,2%	Veloset 1	11%	0,76	0,90	1,22	1,53	12	18	22	37	0,8
	Primary reclaimed sand	50%	New silica sand	50%	Carsil 4000	3,2%	Veloset 1	11%	0,41	0,84	1,20	1,68	13	28	40	13	2,2
	Primary reclaimed sand	75%	New silica sand	25%	Carsil 4000	3,2%	Veloset 1	11%	0,47	0,19	0,84	1,33	8	25	39	11	4,0
	Primary reclaimed sand	85%	New silica sand	15%	Carsil 4000	3,2%	Veloset 1	11%	0,24	0,16	0,58	0,72	1	38	66	5	108,4
	Secondary reclaimed sand	85%	New silica sand	15%	Carsil 4000	3,2%	Veloset 1	11%	0,48	0,87	1,32	2,20	12	23	32	17	1,8
JEZ GEOPOL	Primary reclaimed sand	0%	Olivine new	100%	GEOPOL 620A	2%	GEOFIX 00	0%	0,49	0,72	1,13	1,52	27	36	42	23	0,6
	Primary reclaimed sand	50%	Olivine new	50%	GEOPOL 620A	2%	GEOFIX 00	18%	0,42	0,65	0,87	1,27	20	35	47	13	1,4
	Primary reclaimed sand	75%	Olivine new	25%	GEOPOL 620A	2%	GEOFIX 00	18%	0,31	0,59	0,88	1,19	15	33	46	11	2,1
	Primary reclaimed sand	85%	Olivine new	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,33	0,66	0,81	1,20	14	35	51	10	2,5
	Secondary reclaimed sand	85%	Olivine new	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,52	1,03	1,32	1,71	24	30	36	29	0,5
	Secondary reclaimed sand	90%	Olivine new	10%	GEOPOL 620A	2%	GEOFIX 00	18%	0,58	0,93	1,26	1,60	26	34	40	26	0,6
	Secondary reclaimed sand	100%	Olivine new	0%	GEOPOL 620A	2%	GEOFIX 00	18%	0,36	0,93	1,40	1,74	29	38	46	21	0,6
OPSA PEAK	Primary reclaimed sand	0%	GL27	100%	Cast Clean S27	3%	K4	18%	0,00	0,51	0,97	1,50	25	49	67	8	1,7
	Primary reclaimed sand	50%	GL27	50%	Cast Clean S27	3%	K4	18%	0,00	0,42	0,83	1,74	23	62	91	5	2,9
	Primary reclaimed sand	75%	GL27	25%	Cast Clean S27	3%	K4	18%	0,36	0,54	1,11	1,60	13	42	64	7	4,1
	Primary reclaimed sand	85%	GL27	15%	Cast Clean S27	3%	K4	18%	0,31	0,57	0,80	1,55	10	37	58	7	4,6
	Primary reclaimed sand	90%	GL27	10%	Cast Clean S27	3%	K4	18%	0,22	0,61	0,72	1,09	7	37	60	7	7,4
	Primary reclaimed sand	100%	GL27	0%	Cast Clean S27	3%	K4	18%	0,00	0,41	0,59	1,24	1	46	81	4	99,7
	Secondary reclaimed sand	85%	GL27	15%	Cast Clean S27	3%	K4	18%	0,00	0,55	1,16	2,05	22	50	71	7	2,4
	Secondary reclaimed sand	90%	GL27	10%	Cast Clean S27	3%	K4	18%	0,00	0,40	0,98	2,02	23	57	83	6	2,6
	Secondary reclaimed sand	100%	GL27	0%	Cast Clean S27	3%	K4	18%	0,00	0,37	1,09	2,11	24	61	89	5	2,7
OPSA GEOPOL	Primary reclaimed sand	0%	GL27	100%	GEOPOL 820	3%	SA 121	18%	0,84	1,12	1,19	1,28	4	8	10	58	1,5
	Primary reclaimed sand	50%	GL27	50%	GEOPOL 820	3%	SA 121	18%	1,28	1,31	1,43	1,45	10	17	22	30	1,2
	Primary reclaimed sand	75%	GL27	25%	GEOPOL 820	3%	SA 121	18%	1,36	1,46	1,67	1,66	13	19	24	30	0,9
	Primary reclaimed sand	85%	GL27	15%	GEOPOL 820	3%	SA 121	18%	1,28	1,33	1,41	1,60	14	19	22	48	0,5
	Primary reclaimed sand	90%	GL27	10%	GEOPOL 820	3%	SA 121	18%	1,35	1,73	1,55	1,58	14	19	23	36	0,7
	Primary reclaimed sand	100%	GL27	0%	GEOPOL 820	3%	SA 121	18%	0,88	1,49	1,61	1,63	14	23	29	24	1,0
	Secondary reclaimed sand	85%	GL27	15%	GEOPOL 820	3%	SA 121	18%	1,26	1,40	1,41	1,58	9	14	17	41	1,0
	Secondary reclaimed sand	90%	GL27	10%	GEOPOL 820	3%	SA 121	18%	1,42	1,46	1,60	1,87	8	12	15	47	1,0
	Secondary reclaimed sand	100%	GL27	0%	GEOPOL 820	3%	SA 121	18%	1,49	1,59	1,68	1,92	12	18	22	34	0,9
PEIRON GEOPOL	Primary reclaimed sand	0%	New silica sand	100%	GEOPOL 620A	2%	GEOFIX 00	18%	0,63	1,02	1,30	1,82	27	32	36	37	0,4
	Primary reclaimed sand	50%	New silica sand	50%	GEOPOL 620A	2%	GEOFIX 00	18%	0,47	0,88	1,04	1,47	22	33	41	18	0,9
	Primary reclaimed sand	75%	New silica sand	25%	GEOPOL 620A	2%	GEOFIX 00	18%	0,53	0,82	1,08	1,58	24	33	40	21	0,7
	Primary reclaimed sand	85%	New silica sand	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,50	0,84	1,16	1,61	22	33	42	17	1,0
	Primary reclaimed sand	90%	New silica sand	10%	GEOPOL 620A	2%	GEOFIX 00	18%	0,42	0,84	1,10	1,48	26	37	45	18	0,8
	Primary reclaimed sand	100%	New silica sand	0%	GEOPOL 620A	2%	GEOFIX 00	18%	0,38	0,71	1,01	1,62	27	39	49	15	0,9
	Secondary reclaimed sand	85%	New silica sand	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,46	1,15	1,44	2,10	25	33	39	25	0,6
	Secondary reclaimed sand	90%	New silica sand	10%	GEOPOL 620A	2%	GEOFIX 00	18%	0,46	1,02	1,38	1,67	27	35	42	24	0,5
	Secondary reclaimed sand	100%	New silica sand	0%	GEOPOL 620A	2%	GEOFIX 00	18%	0,37	0,87	1,42	1,98	32	42	49	19	0,6
PEIRON PEAK	Primary reclaimed sand	0%	New silica sand	100%	PEAK	3%	K4	14%	0,20	0,52	0,85	2,46	34	67	91	6	1,7
	Primary reclaimed sand	50%	New silica sand	50%	PEAK	3%	K4	14%	0,00	0,59	1,08	1,77	24	58	83	7	1,8
	Primary reclaimed sand	75%	New silica sand	25%	PEAK	3%	K4	14%	0,00	0,49	1,01	1,95	29	61	85	6	1,9
	Primary reclaimed sand	85%	New silica sand	15%	PEAK	3%	K4	14%	0,00	0,54	1,07	2,20	26	61	86	6	2,3
	Primary reclaimed sand	90%	New silica sand	10%	PEAK	3%	K4	14%	0,00	0,57	1,13	1,83	26	58	82	6	2,1
	Primary reclaimed sand	100%	New silica sand	0%	PEAK	3%	K4	14%	0,00	0,47	1,03	1,89	27	63	89	5	2,5
	Secondary reclaimed sand	85%	New silica sand	15%	PEAK	3%	K4	14%	0,00	0,53	1,12	2,64	30	58	78	7	1,6
	Secondary reclaimed sand	90%	New silica sand	10%	PEAK	3%	K4	14%	0,00	0,49	1,06	2,57	29	57	78	7	1,7
	Secondary reclaimed sand	100%	New silica sand	0%	PEAK	3%	K4	14%	0,00	0,47	1,10	2,20	29	66	91	5	2,5
PEIRON FOSECO	Primary reclaimed sand	50%	New silica sand	50%	Carsil 4000	3%	Veloset 1	14%	0,23	0,90	1,23	1,47	16	26	50	10	2,6
	Primary reclaimed sand	75%	New silica sand	25%	Carsil 4000	3%	Veloset 1	14%	0,24	0,57	0,77	1,16	1	40	70	5	52,7
	Secondary reclaimed sand	85%	New silica sand	15%	Carsil 4000	3%	Veloset 1	14%	0,37	0,84	1,39	1,96	16	37	53	9	2,3
Valumehaanika GEOPOL	Primary reclaimed sand	0%	BK31	100%	GEOPOL 620A	2%	GEOFIX 00	18%	0,78	1,06	1,20	1,51	21	28	33	26	0,7
	Primary reclaimed sand	50%	BK31	50%	GEOPOL 620A	2%	GEOFIX 00	18%	0,62	1,05	1,28	1,51	19	28	35	20	1,0
	Primary reclaimed sand	75%	BK31	25%	GEOPOL 620A	2%	GEOFIX 00	18%	0,43	0,83	1,10	1,57	22	39	52	12	1,3
	Primary reclaimed sand	85%	BK31	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,38	0,74	1,18	1,64	24	41	54	12	1,2
	Primary reclaimed sand	90%	BK31	10%	GEOPOL 620A	2%	GEOFIX 00	18%	0,29	0,70	0,96	1,37	22	42	57	10	1,5
	Primary reclaimed sand	100%	BK31	0%	GEOPOL 620A	2%	GEOFIX 00	18%	0,35	0,65	1,11	1,55	23	45	62	9	1,7
	Secondary reclaimed sand	85%	BK31	15%	GEOPOL 620A	2%	GEOFIX 00	18%	0,55	1,02	1,49	1,83	21	29	35	24	0,7
	Secondary reclaimed sand	90%	BK31	10%	GEOPOL 620A	2%	GEOFIX 00	18%	0,53	1,05	1,57	1,93	20	31	40	18	1,0
	Secondary reclaimed sand	100%	BK31	0%	GEOPOL 620A	2%	GEOFIX 00	18%	0,52	1,16	1,53	2,03	21	33	42	17	1,0

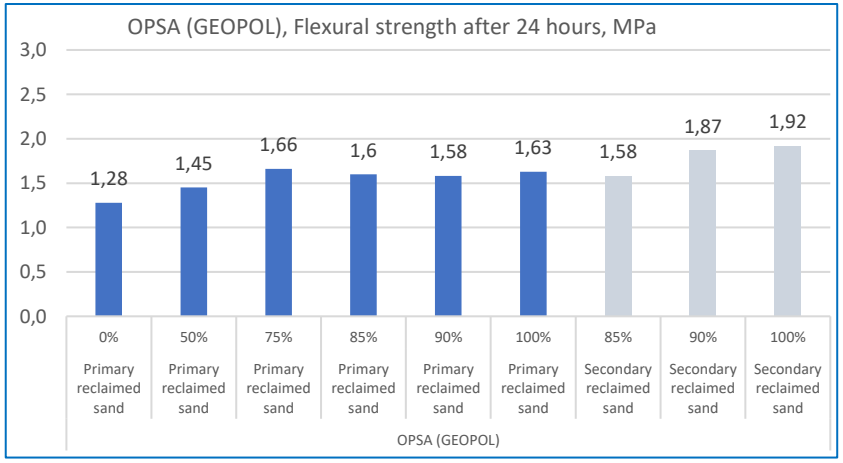
RECLAMATION – Pilot foundries

Laboratory sand mixture tests carried out at SAND TEAM: Flexural strengths after 24 hours



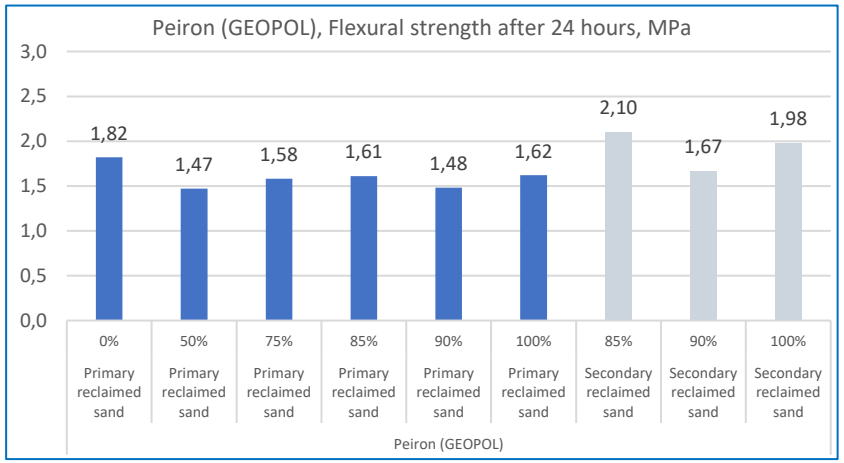


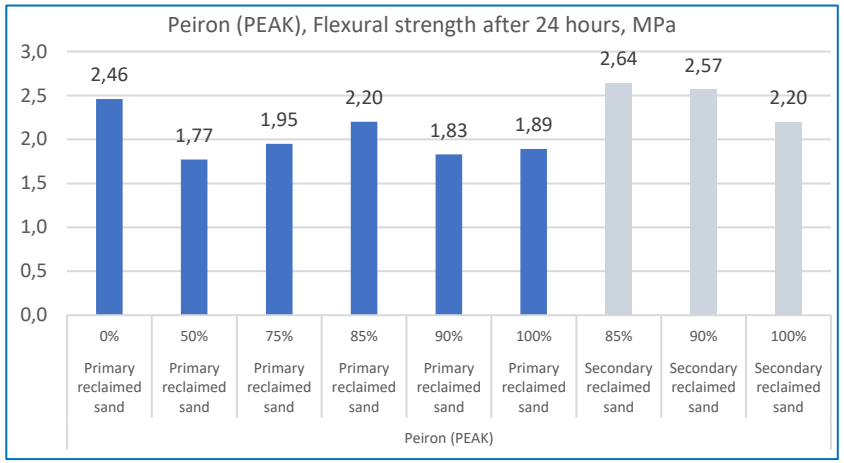


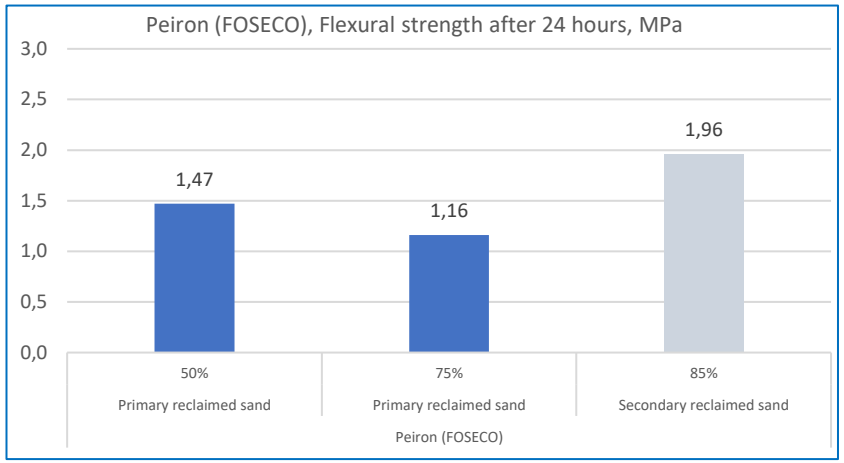


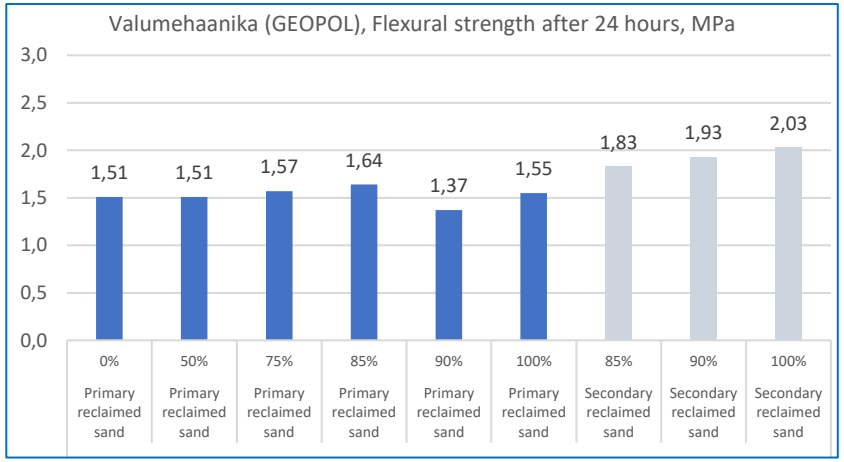
RECLAMATION – Pilot foundries

Laboratory sand mixture tests carried out at SAND TEAM: Flexural strengths after 24 hours









RECLAMATION – Pilot foundries

Used sand waste classification: Table of results

With the contribution of the LIFE programme of the European Union
LIFE21-ENV-FI-Project 101074439

GREENCASTING

Foundry / Binder	Backfilling (the strictest limits)					Disposal of waste at landfill S-OO3			Disposal of waste at landfill S-NO		Assessment of hazardous properties of waste	
	Annex No. 5, Table 5.1	Annex No. 5, Table 5.2	Table 5.2	Annex No. 5, Table 5.3, Column I	Annex No. 5, Table 5.3, Column II	Annex No. 10, Table 10.1, Class IIa	+ TOC (total organic carbon)	Table 10.3	Annex No. 10, Table 10.1, Class III (C10-C40, PAU, Benzopyren, EOX)	Loss on ignition (550 °C) TOC (total organic carbon)	H14, Table No. 1	H15, Table No. 2
Metamsa Foseco	Complies	Complies	Not complies: Fluorides=3,34/1,00 TDS (Dissolved solids) =1090/400	Not complies: Daphnia =100/30	Not complies: Daphnia =100/30	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14** (Ecotoxic)	**The tested sample does not exhibit the hazardous property HP 15** (Waste capable of exhibiting any of the above hazardous properties during handling, which it did not exhibit at the time of generation)
JEZ GEOPOL	Not complies: Ni=2590/65	Not complies: Ni=2590/80	Not complies: DOC=130/50, TDS =732/400	Complies	Complies	Not complies: DOC=130/80	Complies	Complies	Not complies: DOC=130/100	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material does not allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
OPSA GEOPOL	Complies	Complies	Not complies: DOC=66/50, TDS=764/400 Monohydric phenols=0,168/0,100	Not complies: Aliivibrio 15=35,4/25 Aliivibrio 30=36,3/25	Not complies: Aliivibrio 15=35,4/25 Aliivibrio 30=36,3/25	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
OPSA PEAK	Complies	Complies	Not complies: DOC=74/50, TDS =824/400 Monohydric phenols =0,122/0100	Not complies: Aliivibrio 15=27,4/25 Aliivibrio 30=25,6/25	Not complies: Aliivibrio 15=27,4/25 Aliivibrio 30=25,6/25	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
Peiron GEOPOL	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of this tested material allow its use for backfilling.					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			The properties of this material allow it to be deposited in the S-NO landfill.		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
Peiron Peak	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of this tested material allow its use for backfilling.					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
Peiron Foseco	Complies	Complies	Not complies: TDS=798/400	Not complies: Aliivibrio 15=27,8/25 Aliivibrio 30=28,1/25	Not complies: Aliivibrio 15=27,8/25 Aliivibrio 30=28,1/25	Complies	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			The properties of this material allow it to be deposited in the S-NO landfill.		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**
Valumehaanika GEOPOL	Complies	Complies	Not complies: DOC=90/50, TDS=608/400	Complies	Complies	Not complies: DOC=90/80	Complies	Complies	Complies	Complies	Complies	Complies
	The properties of the tested material do not permit its use for backfilling purposes					**The properties of this material allow it to be deposited in the S-OO3 landfill.**			**The properties of this material allow it to be deposited in the S-NO landfill.**		**The tested sample does not exhibit the hazardous property HP 14**	**The tested sample does not exhibit the hazardous property HP 15**

DOC…Dissolved organic carbon. TDS…Dissolved solids. Aliivibrio 15…Aliivibrio fischeri (light emission 15 min). Aliivibrio 30…Aliivibrio fischeri (light emission 30 min). Daphnia…Water flea Daphnia magna (immobilization 48 h)

RECLAMATION – Pilot foundries

Used sand waste classification: Table of results

With the contribution of the LIFE programme of the European Union LIFE21-ENV-FI-Project 101074439

GREENCASTING

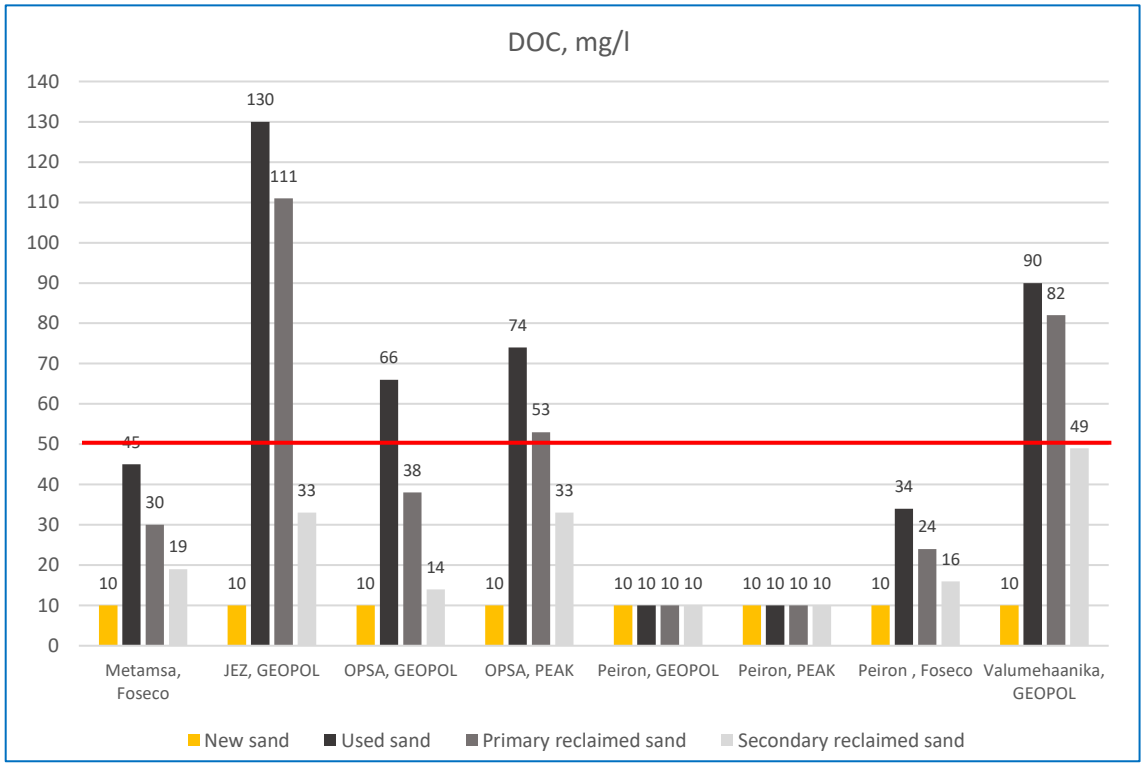
Foundry / Binder	Backfilling (the strictest limits)					Disposal of waste at landfill S-OO3			Disposal of waste at landfill S-NO		Assessment of hazardous properties of waste	
	Annex No. 5, Table 5.1	Annex No. 5, Table 5.2	Table 5.2	Annex No. 5, Table 5.3, Column I	Annex No. 5, Table 5.3, Column II	Annex No. 10, Table 10.1, Class IIa	+ TOC (total organic carbon)	Table 10.3 Landfill S-OO3	Annex No. 10, Table 10.1, Class III (C10-C40, PAU, Benzopyren, EOX)	Loss on ignition (550 °C) TOC (total organic carbon)	H14, Table No. 1	H15, Table No. 2
Metamsa Foseco	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14 (Ecotoxic)	The tested sample does not exhibit the hazardous property HP 15 (Waste capable of exhibiting any of the above hazardous properties during handling, which it did not exhibit at the time of generation)
JEZ GEOPOL	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material does not allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
OPSA GEOPOL	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
OPSA PEAK	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
Peiron GEOPOL	The properties of this tested material allow its use for backfilling.					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
Peiron Peak	The properties of this tested material allow its use for backfilling.					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
Peiron Foseco	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15
Valumehaanika GEOPOL	The properties of the tested material do not permit its use for backfilling purposes					The properties of this material allow it to be deposited in the S-OO3 landfill.			The properties of this material allow it to be deposited in the S-NO landfill.		The tested sample does not exhibit the hazardous property HP 14	The tested sample does not exhibit the hazardous property HP 15

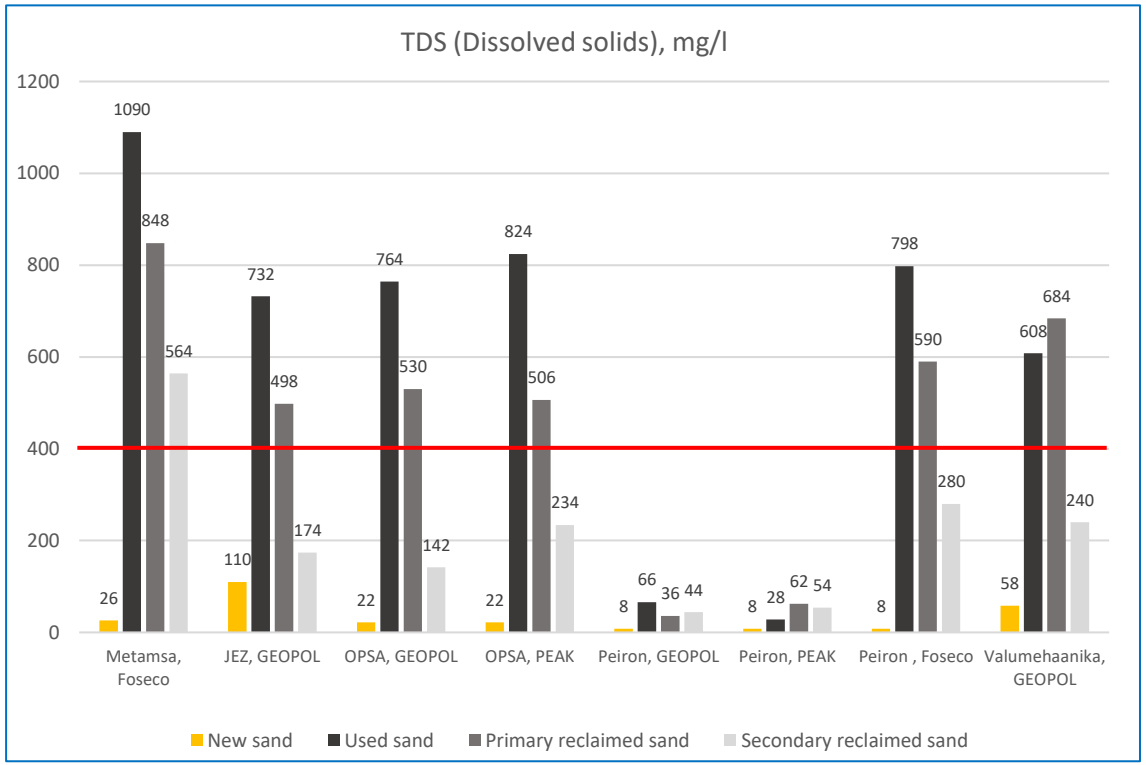
DOC…Dissolved organic carbon. TDS…Dissolved solids. Aliivibrio 15…Aliivibrio fischeri (light emission 15 min). Aliivibrio 30…Aliivibrio fischeri (light emission 30 min). Daphnia…Water flea Daphnia magna (immobilization 48 h)

SAND TEAM

RECLAMATION – Pilot foundries

Used sand waste classification: DOC and TDS





RECLAMATION – Pilot foundries

Conclusions

Foundry / Binder	Primary reclaimed sand	Secondary reclaimed sand	Sand mixtures with primary reclaimed sand	Sand mixtures with secondary reclaimed sand	Waste classification Used sand	Waste classification Primary sand	Waste classification Secondary sand
Metamsa Foseco	Acceptable quality 75%	Quite good quality up to 85% (100%)	Max 75% 1,3 MPa Longer stripping time	85% 2,2 MPa Slightly longer stripping time	No danger properties H14, H15. Used sand: NO: backfilling, YES: landfill S-OO3 and S-NO	No significant improvement. Same classification.	No significant improvement. Same classification.
JEZ GEOPOL (Olivine sand)	Quite good quality 75 up to 85%	Quite good quality up to 85% (100%)	85% 1,2 MPa Shortening of bench life and slightly longer stripping	100% 1,7 MPa Slightly longer bench life and stripping time	No danger properties H14, H15. Used sand NO: backfilling, YES: landfill S-OO3 and , NO: landfill S-NO	No significant improvement. Same classification	Promising improvement. YES: backfilling, YES: landfill S-NO
OPSA GEOPOL	Quite good quality 75 up to 85%	Very good quality Up to 100%	Up to 100% 1,6 MPa Slightly longer bench life a stripping time	100% 1,9 MPa Slightly longer bench life a stripping time	No danger properties H14, H15. Used sand: NO: backfilling, YES: landfill S-OO3 and S-NO	No significant improvement. Same classification	Promising improvement. YES: backfilling
OPSA PEAK	Quite good quality 75 up to 85%	Very good quality Up to 100%	85% 1,6 MPa Shortening of bench life	100% 2,0 MPa Longer stripping times	No danger properties H14, H15. Used sand: NO: backfilling, YES: landfill S-OO3 and S-NO	No significant improvement. Same classification	Promising improvement. YES: backfilling
Peiron GEOPOL	Very good quality Up to 85 (100%)	Very good quality Up to 100%	Up to 100% 1,6 MPa	Up to 100% 2 MPa	No danger properties H14, H15. Used sand YES: backfilling, YES: landfill S-OO3 and S-NO	Same classification.	Same classification.
Peiron Peak	Very good quality Up to 85 (100%)	Very good quality Up to 100%	Up to 100% 1,9 MPa	Up to 100% 2 MPa	No danger properties H14, H15. Used sand YES: backfilling, YES: landfill S-OO3 and S-NO	Same classification.	Same classification.
Peiron Foseco	Quite good quality 75 up to 85%	Quite good quality up to 85% (100%)	50% 1,5 MPa	85% Up to 2 MPa	No danger properties H14, H15. Used sand: NO: backfilling, YES: landfill S-OO3 and S-NO	No significant improvement. Same classification	Promising improvement. YES: backfilling
Valumehaanika GEOPOL	Quite good quality 75 up to 85%	Very good quality Up to 100%	100% 1,5 MPa Longer stripping time	100% Up to 2 MPa Slightly longer stripping time	No danger properties H14, H15. Used sand: NO: backfilling, YES: landfill S-OO3 and S-NO	No significant improvement. Same classification	Promising improvement. YES: backfilling,

Funded by
the European Union

Thank you!

“Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.”