

SedNet Conference 2021

Recycling of river sediments to produce raw materials for construction sector – Upscaling of mineral processing techniques to supply a large batch of sediment

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June 29th, 2021

River Sediments

- Regular dredging to maintain shipping and hydraulic flow:

	Annual dredging (m ³ /year)	Inland waterways (km)
Flanders	4,000,000	990
Wallonia	120,000 to 250,000	450
France	6 to 7,000,000	8,501

- Generally considered as waste → landfilled
- However, potential source of mineral materials:
 - Granulates
 - Sand
 - Silt
 - Clay

Mainly for building sector

- Can be obtained by mineral processing technique
 - Simple
 - Cheap
 - Without chemicals



Direct integration of sediments inside concrete



Raw materials



Raw materials

DM: $\pm 70\%$

Deagglomerated material

DM: $\pm 85\%$

< 5 or 10 mm



Final goal: treat 16 tons of materials to build a bicycle path:

→ Preliminary trials

→ Trials on 1 m³

→ Upscaling

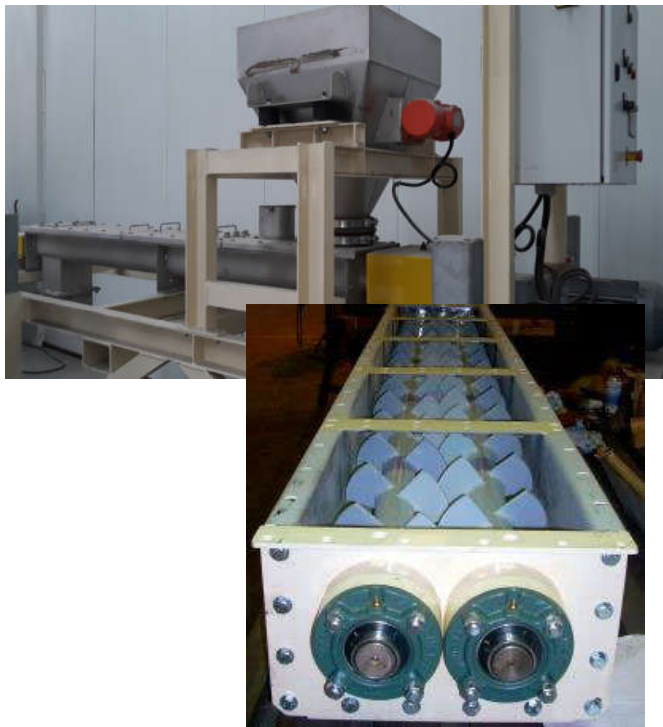
Aim: replacing a certain percentage ($\pm 35\%$) of the sand (0/2 mm) fraction by sediment
Also contains granulates 2/6 and 6/14



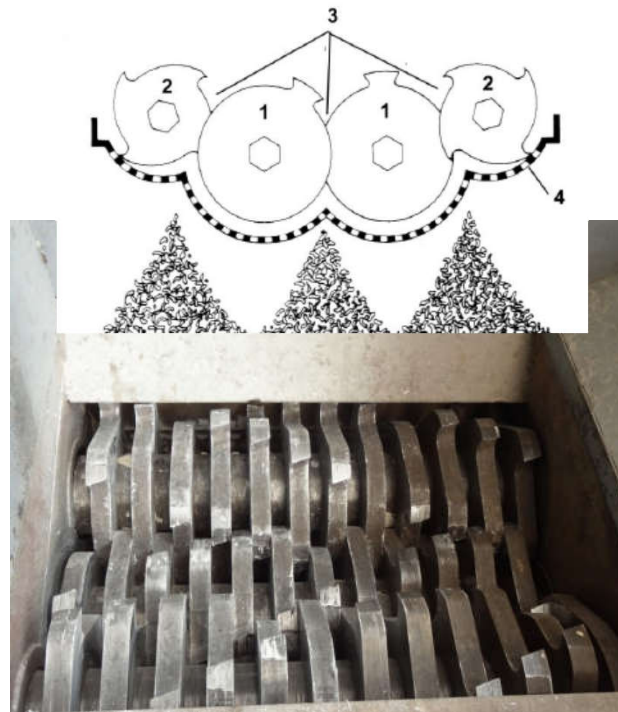
Preliminary trials

Only on few kg, to evaluate the technologies

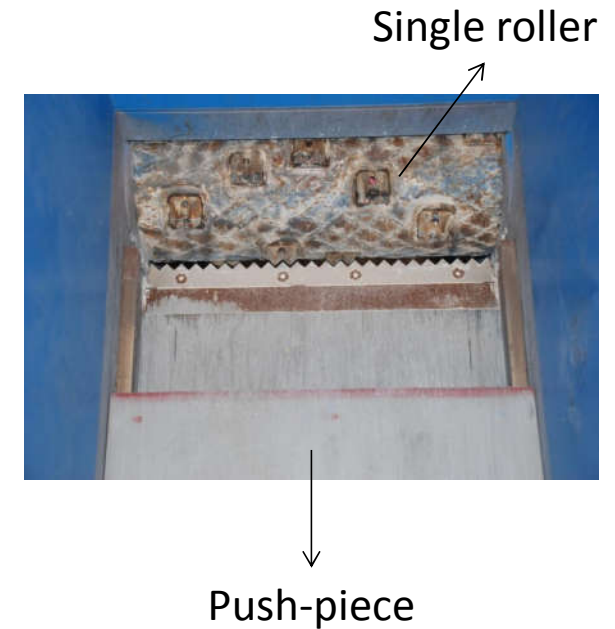
Blade mixer



Shredder

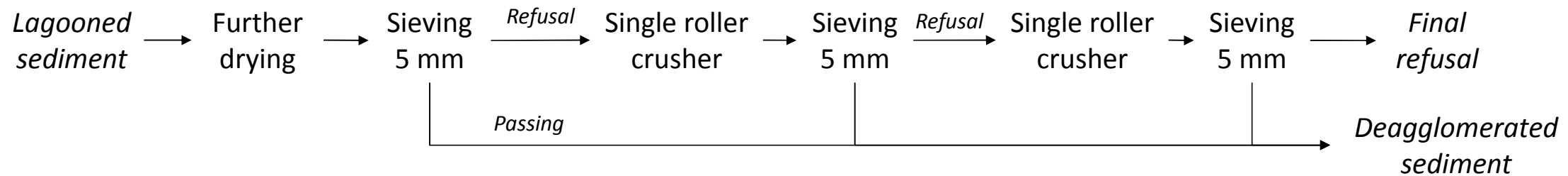


Single roller crusher



Preliminary trials on 1 m³

Combination of sieving, drying and single roller crushing to deagglomerate a sediment



Preliminary trials on 1 m³

VALUE

Steps		Recovered (kg)	Mass balance
Feed		889 kg	
After Drying		689 kg	
Deagglomerated sediment	After first sieving	217 kg	24.4%
	After first roller crusher and sieving	314 kg	35.3%
	After second roller crusher and sieving	72 kg	8.1%
	Total	603 kg	67.8%
Non-deagglomerated sediment		78 kg	8.8%

Nevertheless:

- Further drying after natural dehydration in lagoon
 - Sieving at 5 mm less common in dry way
 - High amount of final refusal
 - High number of successive steps with similar equipment
 - Low flow rate (0.1 to 0.25 m³/h)
- Not suitable for a large volume



Upscaling

Aim: treat 16 tons of materials

- Increasing of the sieve aperture: 5 mm \rightarrow 10 mm
- Low flow rates \rightarrow Using of two-cylinders roller crusher

Toothed roller crusher



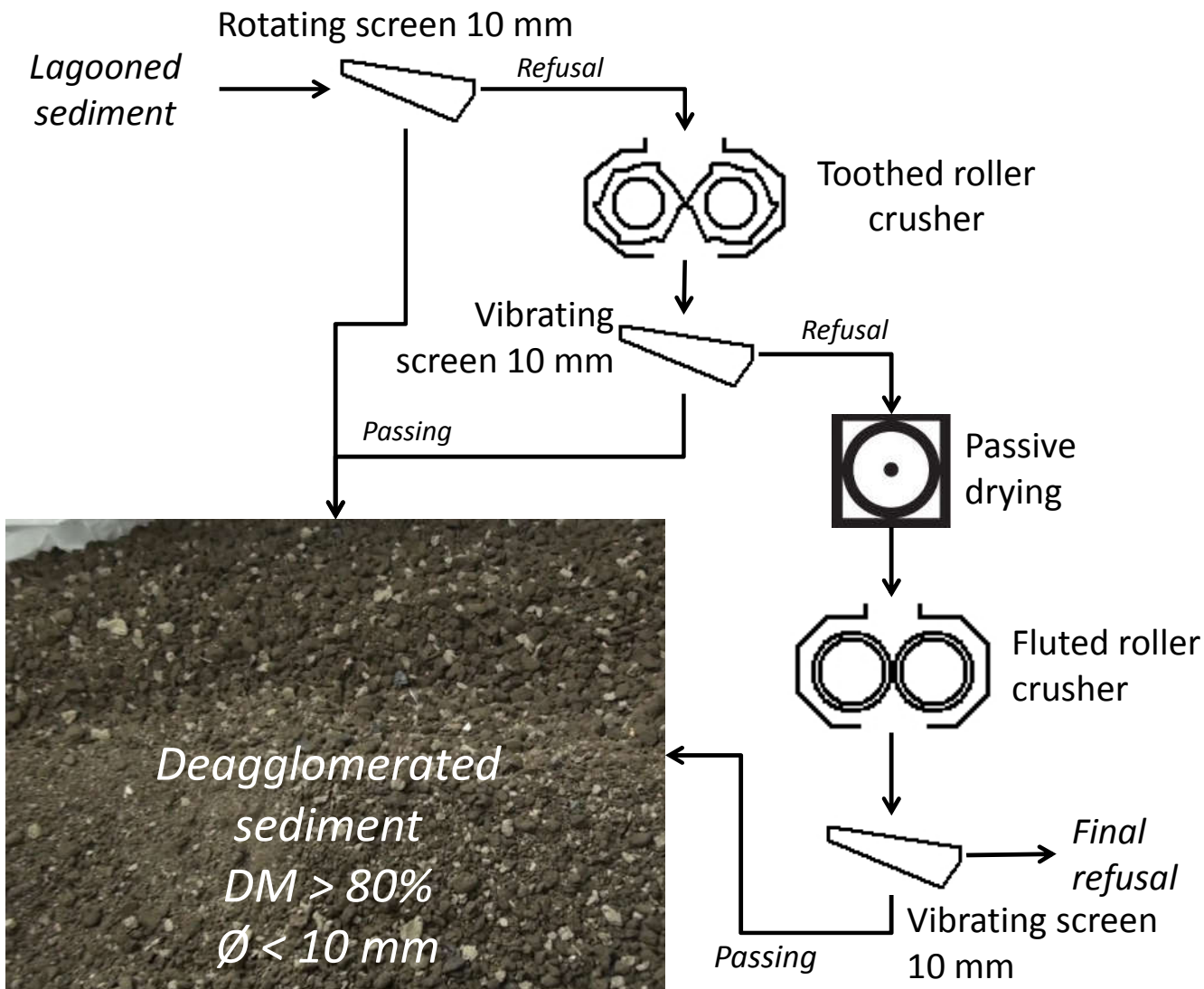
Fluted roller crusher



- Drying of a large quantity of sediment \rightarrow Shift the drying step after sieving and crushing



Upscaled line of treatment



Trial with upscaled line of treatment

VALSE

	Steps	Recovered (kg)	Mass balance
Feed		16,612.0	
Deagglomerated sediment	After first sieving	6,522.5	39.3%
	After first roller crusher and sieving	4,456.4	26.8%
	After second roller crusher and sieving	2,450.0	14.7%
	Total	13,428.9	80.8%
Non-deagglomerated sediment		30.0	0.2%

- Very low amount of final refusal
- Only 80% of recovered deagglomerated sediment
 - Small losses in each steps
 - Drying due to long time storage, use of energy intensive crushing and further passive drying

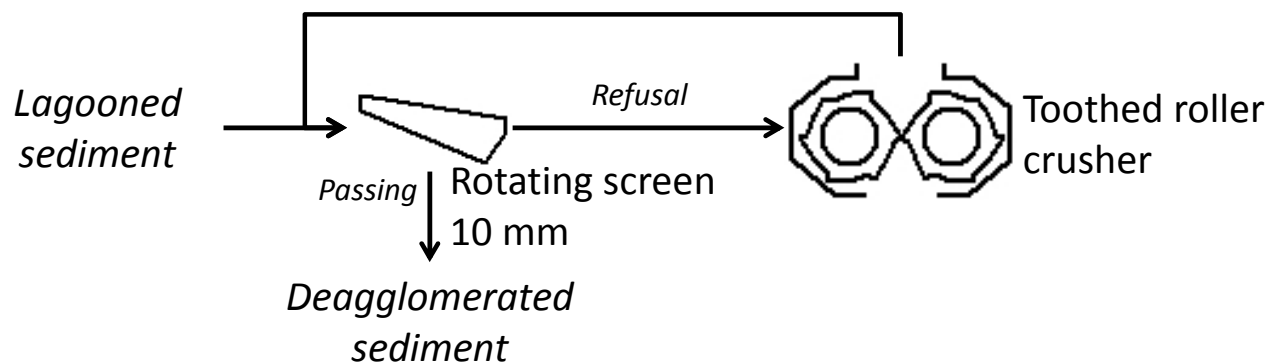


Conclusion

- Validation of roller crusher technologies
- Allow to treat with high flow rate a large amount of materials
- By-passing of initial further passive drying
- Decreasing the amount of final refusal

Perspectives

- 13.5 tons supplied to SPW to build a concrete bicycle path
- Construction between March and May 2021
- Possibility to create a mobile platform



Acknowledgments



VALSE

- Partners:



- Agreement number: 3.5.161
- Project duration: 4 years
- Funding: 4.157.724,61 €
including ERDF (2.078.862,28 €)



LE FONDS EUROPÉEN DE DÉVELOPPEMENT RÉGIONAL
ET LA WALLONIE INVESTISSENT DANS VOTRE AVENIR



Thanks for your attention

Some questions?



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