



Déshydratation continue des sédiments

1ère étape de traitement des fines pour leur valorisation.
Retours d'expériences du projet Interreg SURICATES

IXSANE

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ixsane: Innovation at the service of Humanity and its Environment



2009



Lille (France)

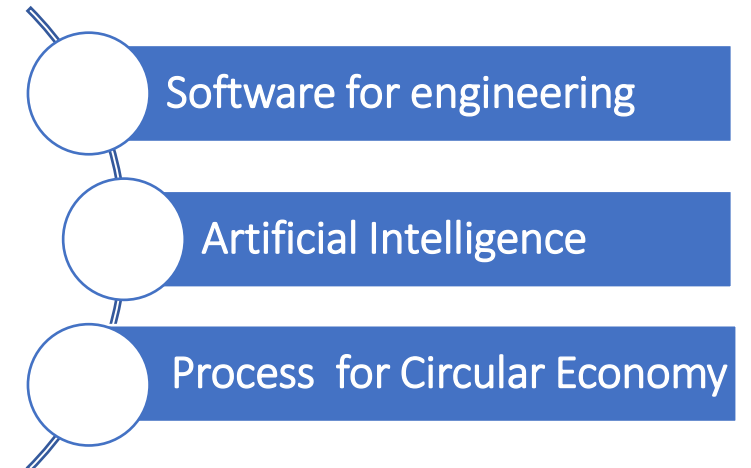
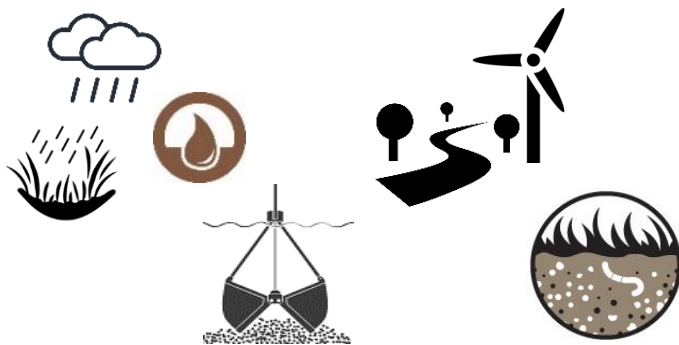


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1.6M

Consulting & Engineering



Our support to sediment managers

- A pilot unit for onsite dehydration tests
- A multidisciplinary team to
 - Support for dredging operations by
 - preparing regulatory documentation
 - assistance for project management
 - Support for the development of eco-materials in a circular economy logic

SURICATES

Sediment **U**ses as **R**esources In **C**ircular And **T**erritorial **E**conomies

SURICATES project objectives

New solutions to increase fine sediment reuse in coastal & erosion protection markets implemented and experimented for roll-out:

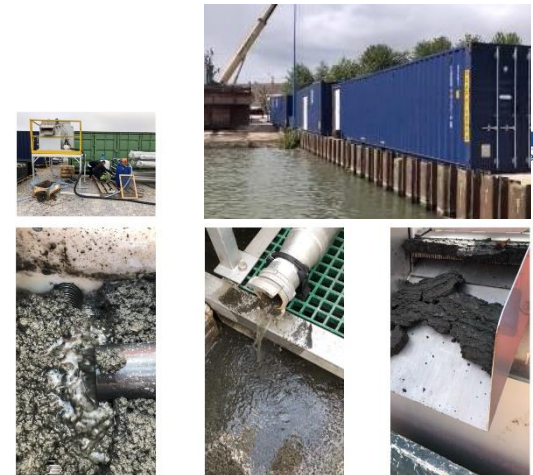
- Sediment reallocation within the system
- Bio-engineering with sediment
- Sediment as a pozzolanic material to strength sediment
- Sediment in concrete

Territorial global cost and benefits optimisation focused

Interreg NWE project : 2017 - 2022

IXSANE contribution

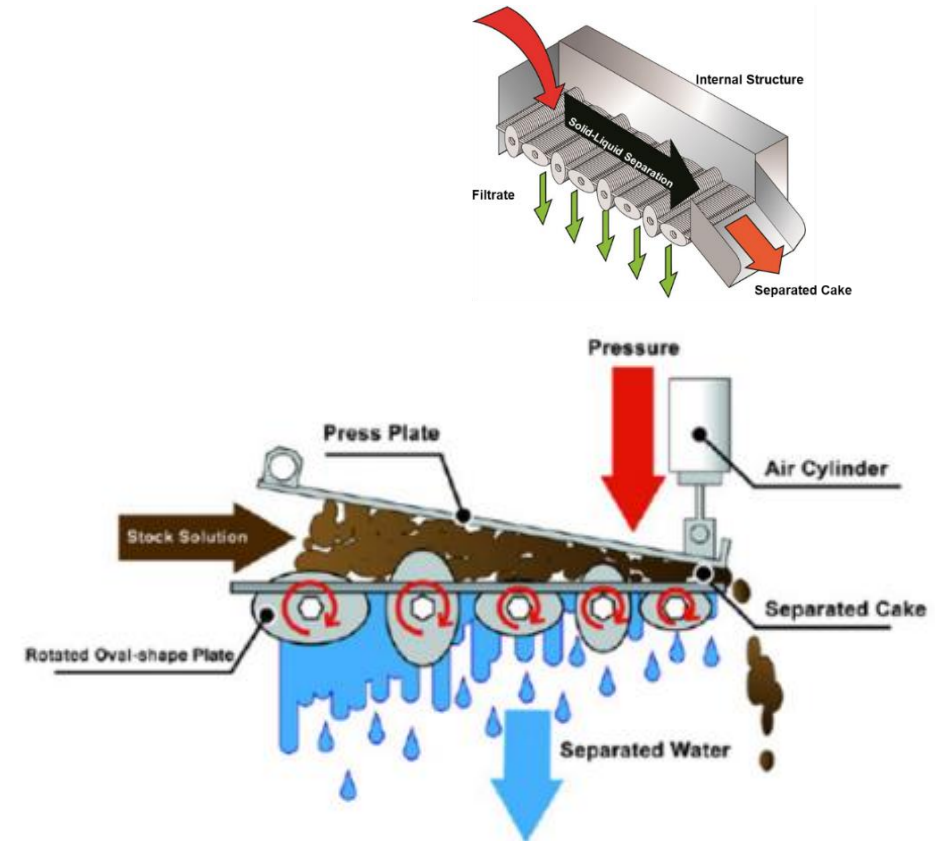
Innovative dehydration equipment reducing space and time needed for dehydration to ease sediment reuse in a circular economy strategy



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CONTINUOUS DEHYDRATION PILOT EQUIPMENT

- Sediment requirement :
Sediment with high water content
(sediment have to be pumped)
- Mobile equipment
- Autonomous process in 3 containers
- Combination of mechanic process and polymers
- Pilot capacity : < 60m³/h



THE BASICS OF OUR TECHNOLOGY

3 Independent modules

– **Module 1**

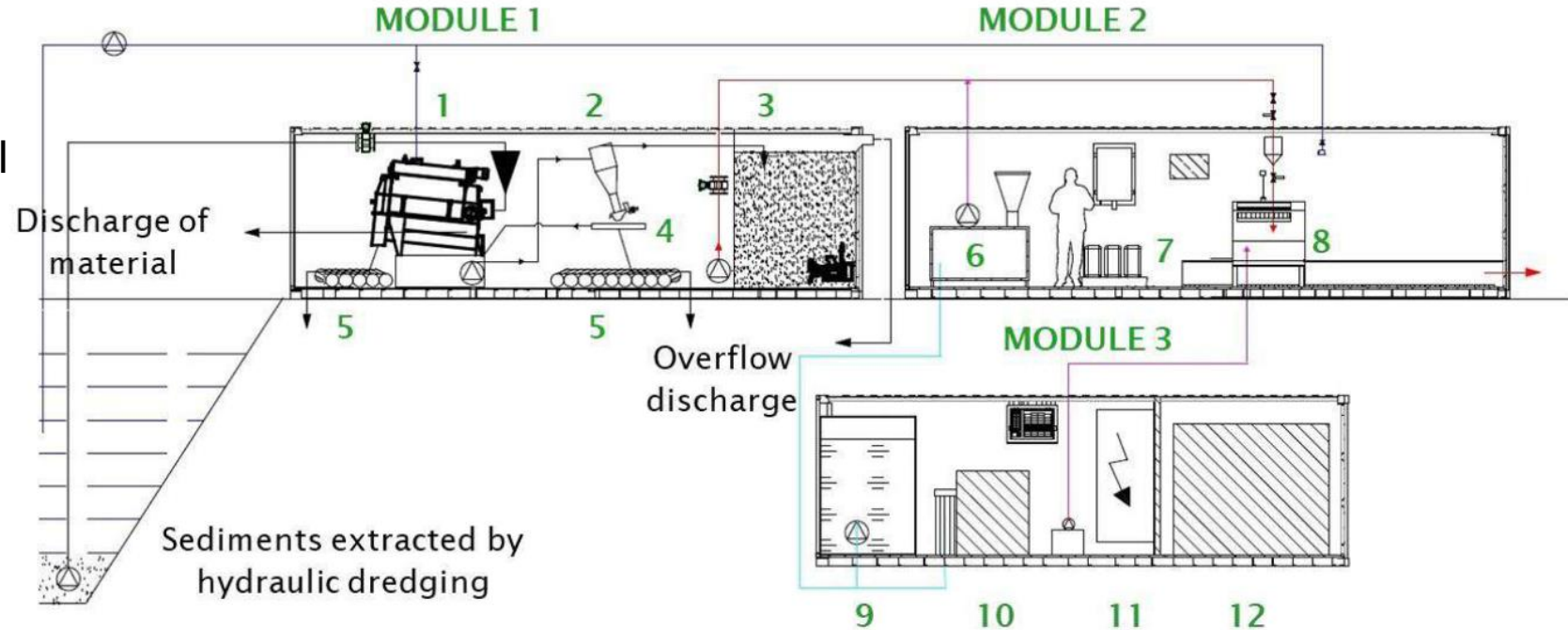
Granular classification of the material into several categories

– **Module 2**

Treatment of the fine part of the material below the threshold predefined in module 1
(Dehydration)

– **Module 3**

Independent operation of the entire machine: energy generation, water storage, spare parts, pipes, toilets,....



HOW IT WORKS?

Hydraulically dredged sediments are pumped into a

Rotary sieve

Sediments with ≤ 2.5 mm →

Hydrocyclone

Sediments with $D > 2.5$ mm are refused

Sediments with $D > 80-40$ μ m are stored for reuse

Sediments with $\leq 80-40$ μ m

Transfer tank

Optimal dosage of flocculant is introduced into the flocculation tank

Press

Sediments are dewatered using a combination of shear and compression forces, gravity and filtration

Wastewater is collected in a tank

Dewatered sediments are stored in tank for re-use

MODULE 1

MODULE 2

Preparation Step

>2.5 mm material extraction



Step 1

Sand extraction



Step 2

Fine fraction dehydration

Module 1

Granular classification of the material into several categories

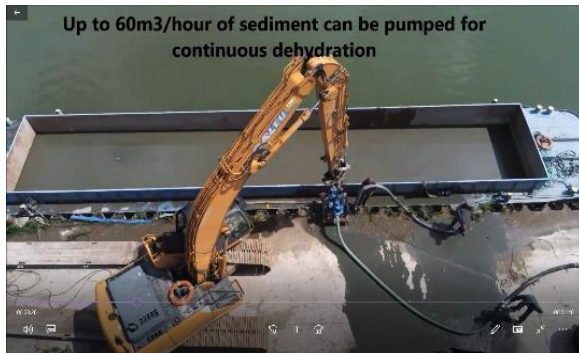


Module 2

Treatment the fine part of the material below the threshold predefined in second module: Dehydration



On sites demonstrations



ENTRANCE
70% of water



MODULE 1
Granular classification
($D > 80-40 \mu\text{m}$)



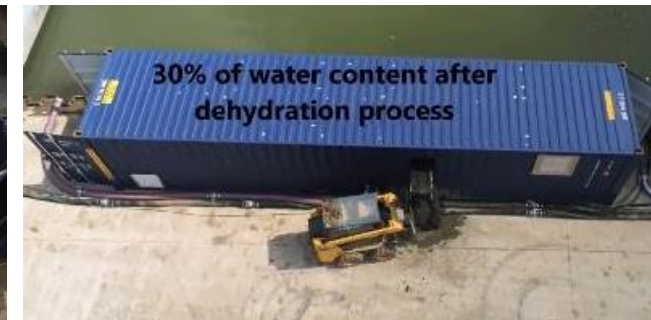
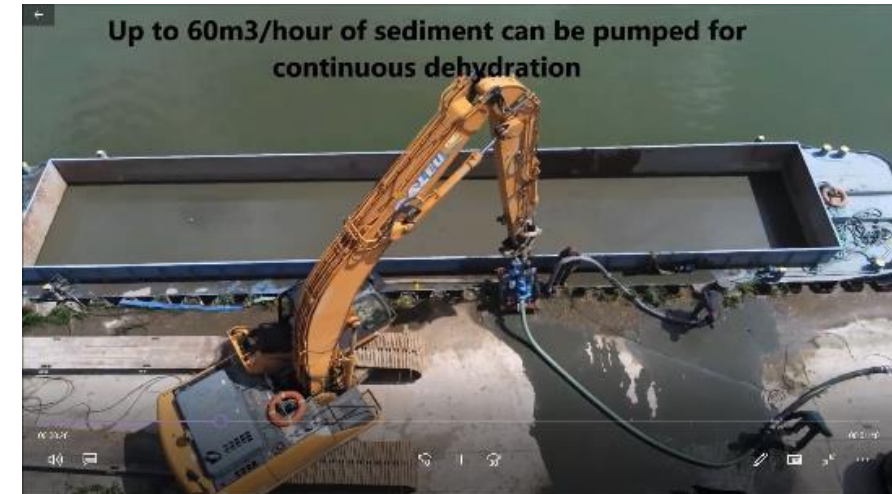
MODULE 2
Dehydrated products
($\leq 80-40 \mu\text{m}$)

ON-SITE TESTS with sediments

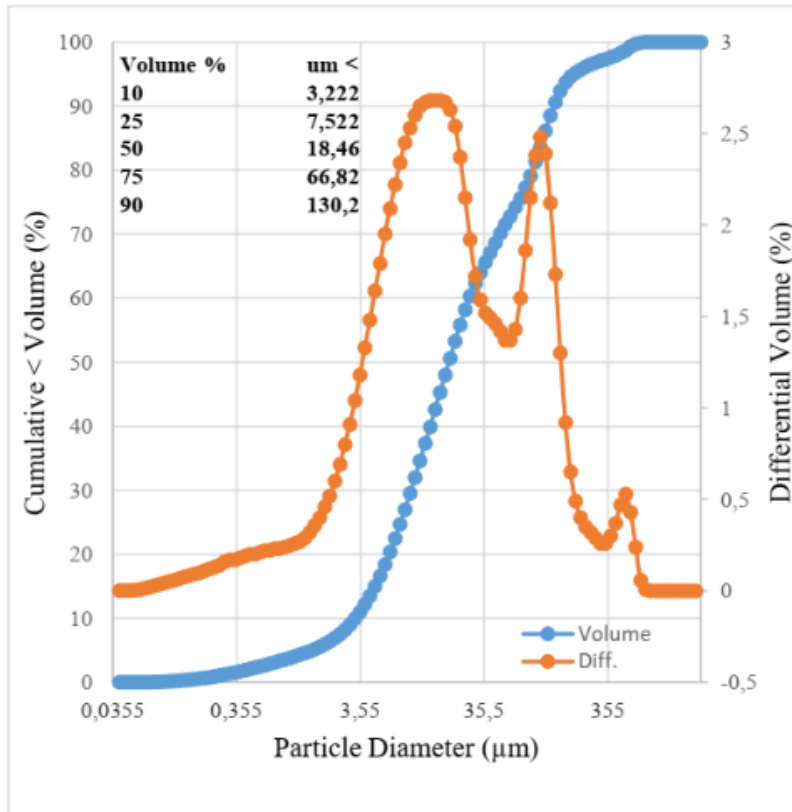


Sediments to be dehydrated

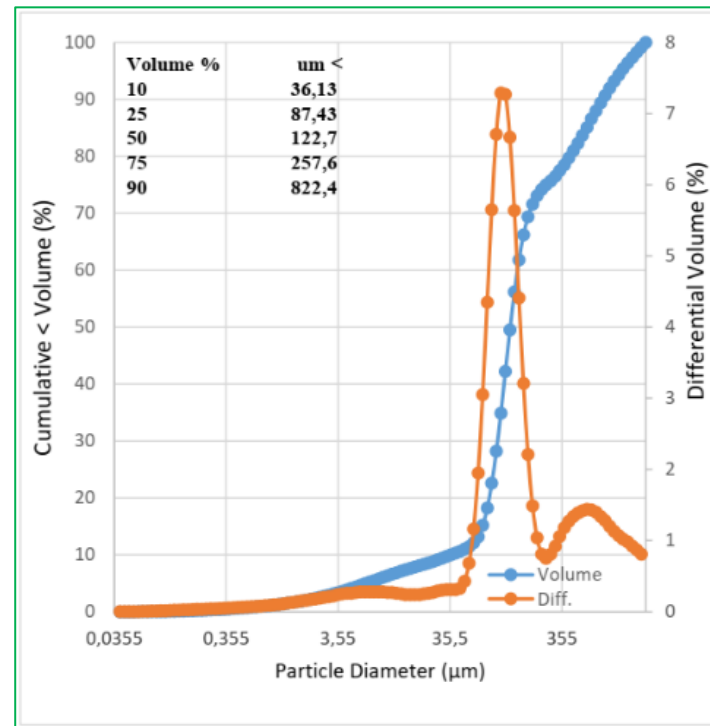
ON-SITE DEMONSTRATION with fluvial sediment



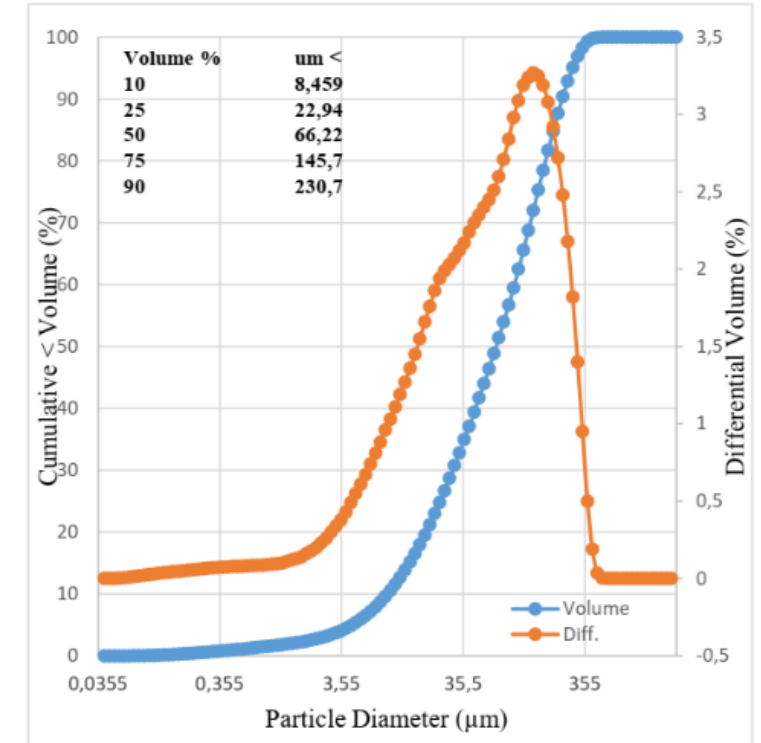
PERFORMANCE EVALUATION OF SEPARATION PROCESS



raw sediment



Extracted sand



Fine fraction

Analyses realized by IMT Lille-Douai

REUSE POTENTIAL EVALUATION

Sediments	LOI _450°C	LOI_550°C	Gas Pycnometer	Clay-loam fraction (%)	Sand fraction (%)	Gravel fraction (%)	Substitute for sand/pozzolanic addition : hypotheses at this stage
raw sediment	6,72	7,88	2,54	49,97	34,92	15,09	Substitute for sand/ Pozzolanic addition
Extracted sand	4,17	3,90	2,71	4,34	94,95	0,69	Definetly substitute for sand
Fine fraction	8,60	9,96	2,42	25,8	73,50	0,59	Substitute for sand/ Pozzolanic addition

Analyses realized by IMT Lille-Douai

ON-SITE TESTS with sediments from La Rance estuary



Sediments to be dehydrated

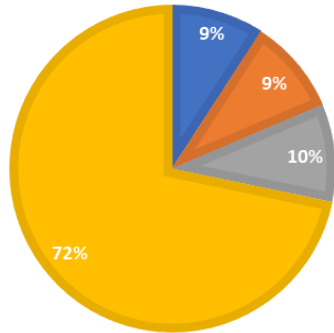


Sand extraction results

20% of fine fraction / 80% of sand

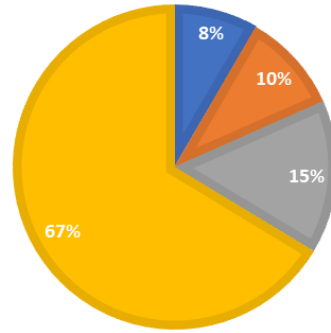
SAND FRACTION - SAMPLE 1

■ 2 - 20 µm ■ 20 - 63 µm ■ 63 - 200 µm ■ 200 - 2000 µm



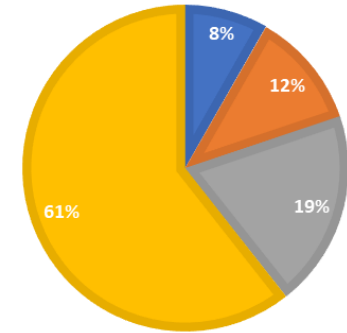
SAND FRACTION - SAMPLE 2

■ 2 - 20 µm ■ 20 - 63 µm ■ 63 - 200 µm ■ 200 - 2000 µm



SAND FRACTION - SAMPLE 3

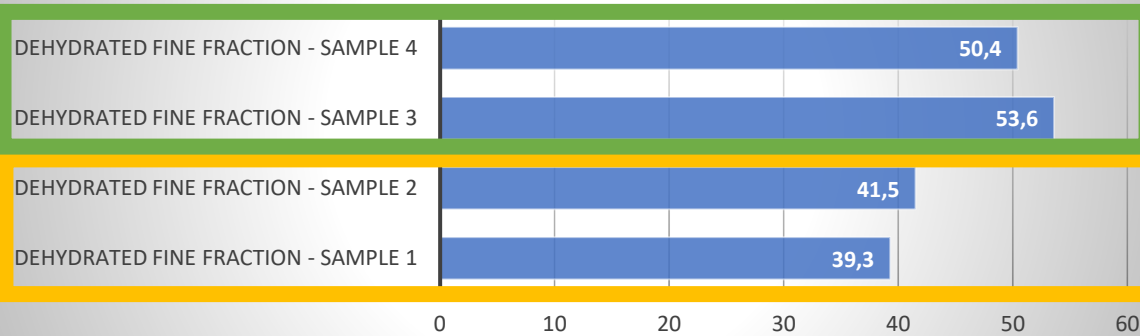
■ 2 - 20 µm ■ 20 - 63 µm ■ 63 - 200 µm ■ 200 - 2000 µm



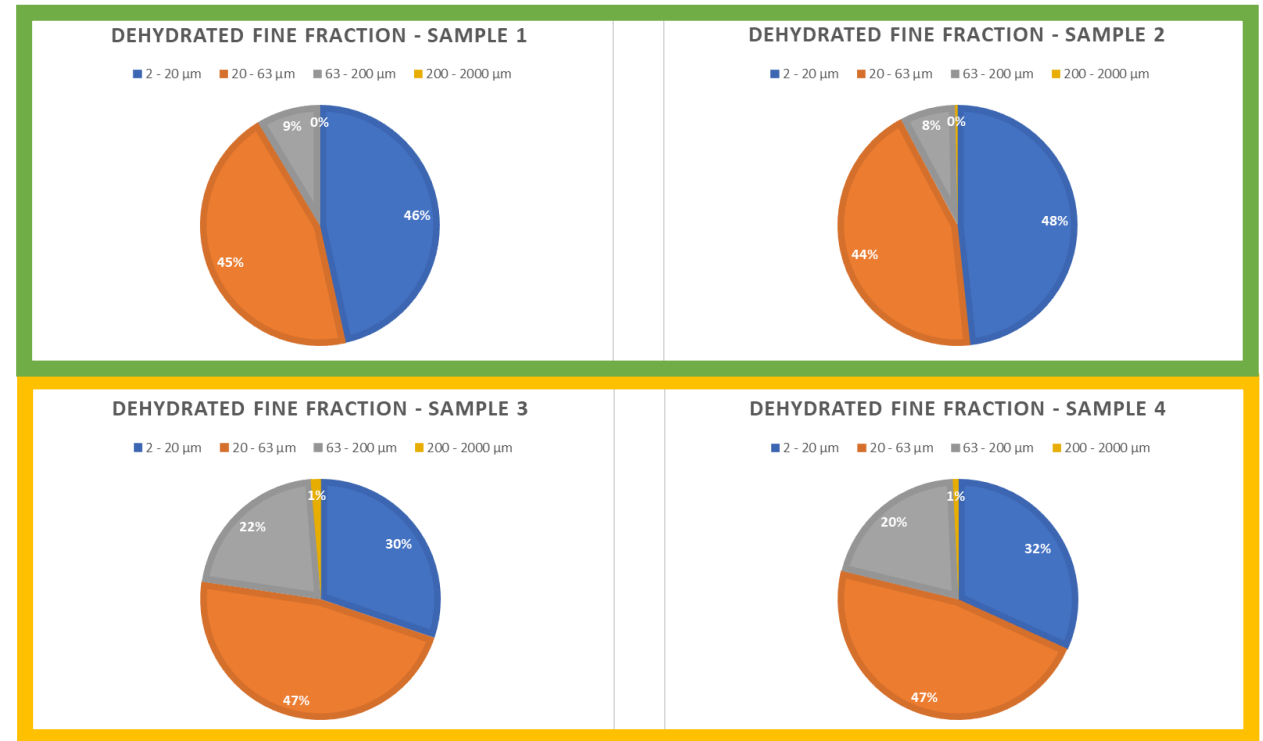
Fine fraction dehydration results

Process in stabilised phase

Dry Matter content (% of total weight)



Process in adaptation phase



PILOT EVALUATION FOR FINE FRACTION DEHYDRATION WITH SEDIMENTS FROM QUARRIES

Quarry 1



Quarry 2



SAND TREATMENT IN VENDÉE REGION

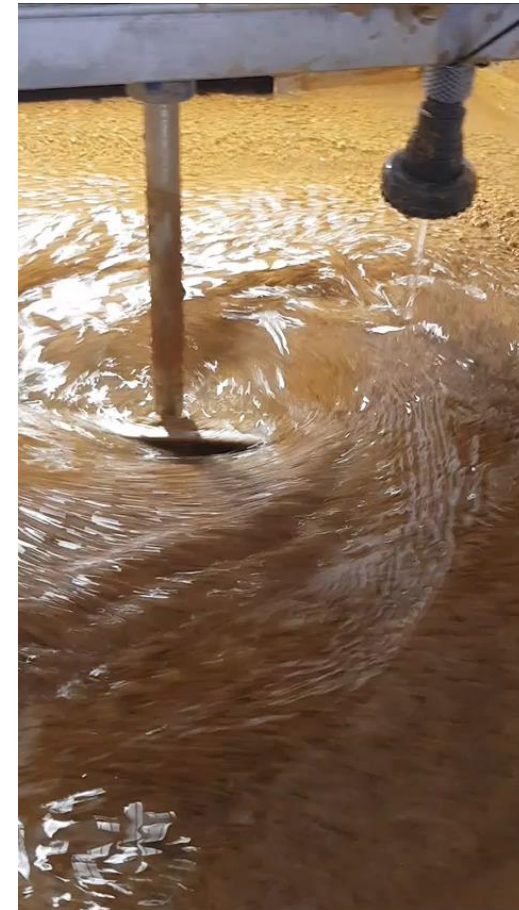
Raw water



Granular classification



Fine parts Treatment

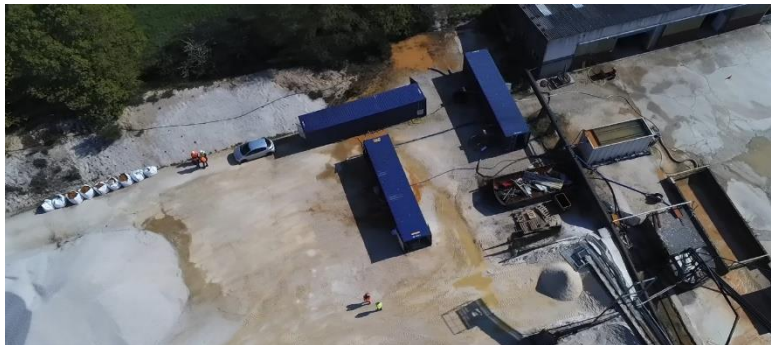


DEHYDRATED PRODUCTS READY FOR REUSE



KEY RESULTS

Quarry 1




Quarry 2: La Sablière des Landes





		DEHYDRATION PROCESS MODULE			
		WATER		SLUDGE	
		Input	Output (Water discharge)	Input	Output (dehydrated sludge)
Analyses		Suspended Matters		Dry Matters	
Tests		mg/l	mg/l	%	%
12/4	Quarry 1 - Test 1	56 400	87	1,44	43,4
13/4	Quarry 1 - Test 2	118 000	6,7	4,71	43,3
14/4	Quarry 1 - Test 3	168 000	59	1,15	43,5
15/4	Quarry 1 - Test 4	192 000	30	5,24	44,3
19/4	Quarry 1 - Test 5	78 400	84	5,25	46,3
20/4	Quarry 1 - Test 6	94 000	160	1,65	51,5
20/4	Quarry 1 - Test 7	145 000		0,84	45,1
21/4	Quarry 1 - Test 8	117 000	5,3	1,66	46,7
26/5	Quarry 2 - Test 1	63 100	46	2,19	45,9
27/5	Quarry 2 - Test 2	57 800			43,1

Average	108 970	59,8	2,7	45,3
Min	56 400	5	1	43
Max	192 000	160	5	52



Increasing sediment reuse for erosion and flood protection

PROJECT AREA



Video on YouTube

<https://youtu.be/NJ-iuAgOu1Q>

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