

A mobile & continuous granulometric classification & dehydration pilot to improve sediment reuse strategies. Case studies & results interpretation

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Introduction:

Dredged sediments are a mix of various granulometry of matters with variable chemical characteristics in each fraction, and water. The water content of fresh dredged sediment is a key limiting factor for reuse where chemical and physical characteristics need to comply with the final application requirements. The water content increases the transportation cost, generates complexity and limitations for sediment manipulation, impacts of road transport and, in addition, needs time and specific sites for dehydration. To address chemical/physical properties variations and water content issues and make reuse applications possible, various techniques exist: Natural, Chemical, Thermal and Mechanical treatments. With the SURICATES Interreg NWE project, IXSANE developed and tested a mobile pilot plant to be used as close as possible to dredging site with fresh dredged materials. Packed in three containers to be installed on land or on barges for ease of operation, the capacity of this equipment is up to 50m³/hour of fresh dredged sediment and combines mechanical and chemical processes for continuous dehydration and granular classification.

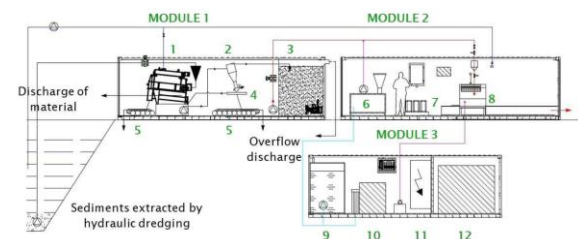


Fig. 1: Granular classification and dehydration pilot.

Methods: Mechanical processes are used to extract residual waste (> 2.5mm), to extract for reuse the sandy fraction (>60µm), and to press the thin sediment fraction after flocculation treatment in a continuous process for dehydration. Newly built in 2020, an evaluation campaign has been engaged in France and Scotland with fluvial or marine sediments and sand quarries washing waters to evaluate the technical performance of this equipment and economic data related to such operation.

The flocculation process is a sensitive part of this continuous process. It has been addressed by specific tests in quarries with wasted fine fraction of extract materials to complete on-site tests with fresh dredged marine or fluvial sediment. Technical parameters and sediment properties have been monitored in addition to economic data related to the use of such equipment from the perspective of the circular economy (direct and indirect cost & benefits evaluation).

Results: Real scale tests demonstrated the efficiency of the sand fraction extraction to increase sediment mineral fraction reuse options with 20% of fine fraction (2-63µm) and 80% of sand (63-25µm). Dehydration of fine fractions reach more than 50% of dry matters in less than 1hour.

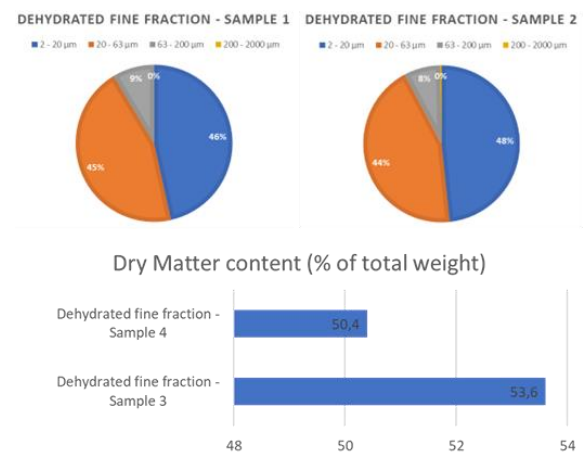


Fig. 2: sand and fine fraction dehydration results.

Discussion: Valuable results are obtained with a pilot scale unit with limited capacity. Obtained results, upscaling challenges and operational issues will be presented and discussed.

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