

Re-thinking cohesive sediment dredging management; a combination of fundamental and pragmatic research.

Styn Claeys^{1,4}, Renaat De Sutter¹, Peter Staelens², Joris Vanlede³, Toon Verwaest³, Jeroen Verwilligen³, Guillaume Delefortrie³

¹Antea Group, Roderveldlaan 1, 2600 Berchem, Belgium

²DOTocean, Lieven Bauwensstraat 20, 8200 Brugge, Belgium

³Flanders Hydraulics Research, Berchemlei 11, 2140 Antwerpen, Belgium

Phone: +32-(485)-55.60.76

E-mail:

renaat.desutter@anteagroup.com

Introduction:

The last 5 years more efforts have been put in understanding the manipulation of cohesive sediment during conventional and alternative dredging.

We already know for 30 years that the mud layers can exist in different status depending on their composition and history: from fluid to consolidated.

This history consists of free consolidation and possible deformation by natural processes or anthropogenic manipulation. Still, the complex mix of dewatering (permeability; dewatering channels, diffusive dewatering,...) and strength formation processes (Van der Waals; stacking; pore water over pressure; biochemical bindings;...) is poorly understood.

To understand the influence of these continuous changing processes, in function of navigational risk, we apply different research methods within our research projects at Flanders Hydraulics Research.

Methods:

The instrumentation consists of physical scale models; numerical models; 3D navigation simulations; real-scale mud manipulation; fundamental sediment research (in the unique test facility of the Sediment Test Tank); in-situ dredging tests and real scale navigation through mud. All the above research methods are combined to obtain a safe navigation based dredging management.

The last years new important tools are used to fine-tune or re-think cohesive sediment dredging. For instance a Computational Fluid Dynamics model is being built. Alternative in-situ dredging tests (mud conditioning; agitation dredging) and real-scale navigation tests are being performed in different harbours and in the Sediment Test Tank. These tests are followed up by an extensive monitoring campaign also with relatively new measurement methods (freedfall-cone penetration tests (FF-CPT); density; acoustical bathymetry) to estimate the

differences between conventional and alternative dredging.

Discussion:

Our presentation will elaborate upon the pros and cons of "traditional" and "new" methods of research and in-situ testing and discuss the scientific hurdles to take in the near future.

References: [1] SedNet et al. (2003) *J Soils Sediments* **11**:111-122; [2] Dimas et al. (2004) *Wasserwirtschaft* **22**:222-233.