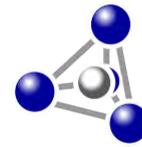




Royal IHC



**GEOPOLYMER**  
INSTITUTE

## Geopolymer camp 2014

**Low temperature curing Geopolymer combinations for creating land, eliminating waste & high wear resistance materials**

July 2014

A.J.P.M. (Joost) Koevoets

**The technology innovator.**



# The company

In 2013, Royal IHC had been in existence for 325 years. The predecessors of the Kinderdijk shipyards, L Smit & Zoon and J & K Smit, were already active in the 17th Century, IHC has for the last 150 year specialised in building advanced equipment for the dredging, off shore, and (deep sea) mining industry. IHC is mindful of the environmental and social impact of its activities on people. Its corporate social responsibility

# Bio



- Dredging process
  - Efficiency, emissions, alternative fuels
  - Treatment of dredged material
    - Silt treatment (separation/processing)
    - Solidifying dredge materials ( dewatering, geopolymers)
    - ....
- Equipment (specialised materials)
  - Drives and automation ( AI systems, Drives, PM technology, water hydraulics)
  - Autonomous systems
  - High wear and tear resistance materials ( Cutters and hoppers)
    - Steel alloys ( cast & forge)
    - Polymers (basalt fibers & Geopolymer resin?)

## Validating materials

- Historic: Cesium source for continuous density check
- NASA / ESA contest for Mars explorer
  - 4 designs, one winner
  - Patent with Dutch partners
  - Industrial application

## Ore Sorter

- High speed rock analyses
- 1000 ton / hour belt
- Reduce waste
- No physical contact with ore flow.
- ROI > 30%



In the case of Port 2000 Le Havre, not only the economical and functional requirements, but also environmental issues were taken into account. The construction was executed in phases to minimize the ecological effects on the estuary. Compensation measures were taken to mitigate environmental effects or even enhance the ecosystem.

The expansion of a harbour is mainly based on economical issues. The design and construction methods are shaped by functional requirements and cost limitation only.



- Dredging process, “creating land for the future”
  - Sealevel rising, coastal habitation
  - Suitable building materials under current technology
  - Processing dredged materials
  - Challenge:
    - Volume processing; 2300 m<sup>3</sup> hopper, full in one hour, empty in 1.5 - 2 hours
    - Variation in basic materials
      - Sand is not sand
      - Clay consistency
      - Organic components
    - Reaction Agents
      - Agent consistency
      - Composition in fly ash
      - Environmental impact





**Thank you for your attention**



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**Merci pour votre attention**