

Next Level of Water Infrastructure Management Using High Definition Digital Twins

Christian Hesse, Berit Jost, Karsten Holste, Joerg Blankenbach, Ralf Becker and Ahmed Alamouri, Pedro Diaz (Germany), Markus Gerke;

Key words: Bridge surveying; Deformation measurement; Hydrography; Laser scanning; Professional practice; Risk management; Infrastructure; Management; Lifespan Prolongation

SUMMARY

Aging infrastructure of harbors, bridges and roads is one of the greatest challenges in most countries. In Germany alone 70% of the 2.500 infrastructure building along waterways like quay walls, locks and barrages have a rating of lowest or second lowest possible grade. 20% are older than 100 years, 80% are older than 50% with an expected lifespan of 80-100 years. The situation with bridges is similar.

This paper will present an approach called “InfraCloud” – partly financed by the German government - for the management of harbor infrastructure by using an innovative measurement platform and a web based digital twin solution to manage infrastructure digitally and much more efficiently in order to prolongate the lifespan of this critical infrastructure by up to 10 years.

This is being achieved by creating a digital twin platform that can handle point clouds, meshes, HD images and all kinds of documents capable of processing and streaming terabytes of data.

In order to precisely assess damages, classify them, and enable an automated workflow for repair, maintenance submission of tenders and construction verification a couple of AI tools have been developed and implemented.

The presentation will show the AI workflow itself as well as the efficiency gain that can be achieved by using AI assisted workflows for data processing and extraction of valuable information for asset owners, civil engineers and construction companies.

Next Level of Water Infrastructure Management Using High Definition Digital Twins (13575)
Christian Hesse, Berit Jost, Karsten Holste, Joerg Blankenbach, Ralf Becker and Ahmed Alamouri, Pedro Diaz (Germany), Markus Gerke;

FIG Congress 2026
The Future We Want - The SDGs and Beyond
Cape Town, South Africa, 24–29 May 2026

Another innovation presented in this paper is the implementation of a live digital twin that is able to update eg. connected parametric BIM models.

Also the advantages of working with ultra high resolution digital as built twins will be presented on several successful renovation projects for infrastructure carried out by HydroMapper so far. This includes real world examples of lifespan extension of critical port infrastructure of 5-10 years.

The benefit for operators and engineering companies will be shown by several KPIs regarding cost and time.