BIM based rehab and maintenance process for roads and highways

Manu Marttinen
NCC Industry, Finland

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#NVF
• BIM in general

• Forskartävling Vägteknologi
  – Background of my research
  – Road Rehab Process – Case Highway 51 in Finland 2012
  – Information Models in Maintenance – Case Road 55 in Finland 2014
  – Results
BIM in general
Building Information Model ??
Building Information Model ??
BIM = data
Why we are using BIM?

Tietoa hukkuu hankevaiheissa...
Background
Built Environment PRE and Infra FINBIM

- Aim of PRE is to “promote BIM” in Building and Infra Construction areas
- PRE total budget is 21 M€, 37 industrial and 6 research partners
- Infra FINBIM is one of the six PRE work packages
- Infra FINBIM budget is about 6 M€, consortium partners 18
Common InfraBIM Requirements
- What and how to model

InfraBIM Classification System
- Infrastructure classification

InfraModel Data Exchange
- InfraModel3
  - Definition
  - Guidelines for use
My research


Intelligent road condition monitoring and maintenance planning

Posted on 2014-02-04 by Janne Porkka

Using BIMs can be divided in three procedures in road maintenance process. First procedure is similar to a typical BIM process when building new infrastructure. Second one is maintenance sectors’ own model for to handle one maintenance site or even whole road network. The third procedure is to know, how to store and use, during maintenance phases, the InfraBIM data produced when designing and constructing new infrastructures.

RESULTS

The first developed procedure concluded that typical InfraBIM model can be copied easily to maintenance and road rehab process by using same kind of model than typical construction process.
Road Rehab Process
Case Highway 51 in Finland 2012
Maintenance BIM 2012: Highway 51 pavement rehabilitation pilot

• Old two-lane road will be part of a four-lane highway
• Aim to reconstruct wearing course by milling and paving
• Construction project along a very busy road
• Laser scanned and GPR measured model in 3D rehabilitation design
• Measurements, modelling and repair planning and cutting executed May-Aug 2012
• Destia & NCC Roads Oy
Road rehab process model

1. GPR & Core samples
2. Mobile Mapping Trimble MX8
3. Point cloud processing, Terrasolid
4. Terrain model (TIN) creation, Tekla Civil

Additional steps:

- Alignment design and optimization, Tekla Civil
- Alignment export in VGP and line format
- BC-HCE, Export in binary to GCS900
or areas where the risk for puddles is high. The slope of the red areas is \( \leq 1\% \).
Information Models in Maintenance
Case Road 55 in Finland 2014
Maintenance BIM 2014: Road 55 pavement Maintenance pilot

- “Middle of nowhere”
- Finnmap Infra & NCC Roads Oy
RESULTS

- Research context

- Operatinal context
RESULTS

Research context
• One Master Thesis
• Two result reports
• Two journal papers
• Multiple articles in magazines
• Multiple seminar performances
RESULTS

Operational context – Rehab
• Road repair actions can be planned and optimized
• 3D Machine control systems in milling machine and paver improve accuracy and efficiency
• Model accuracy even better than 15 mm

Operational context – Maintenance
• Road Administrator knows better how much maintenance will cost
• 1 euro to design saves 5 euro in asphalt mass
LINKS


Lyrnsintä suunnittelemien mukaan opastavaa koneohjausta hyödyntäen.