



## HENT Construction company of Norway takes advantage of model-based design, production and FM

*HENT currently deploys BIM/openBIM on construction projects with an accumulated area of more than 300,000 m<sup>2</sup>. In 2010, HENT determined that the BIM technology and competence of the AEC industry had matured enough for them to start an offensive BIM/OpenBIM drive on their projects. The return on investment (ROI) has been significant and is motivation for the increased deployment; resulting in better understanding of what is to be delivered -the product, better dialogue with customers, improved quality of construction documentation, improved quantity takeoff (QTO), improved work planning and less re-work.*

**H**ENT is one of the pioneers of OpenBIM in Norway and was the contractor for the front entrance building project at the New Akershus University Hospital (New AHUS) between 2007 and 2008, one of the first OpenBIM pilot projects in Norway. The experiences were mixed and further HENT deployment was put on hold. However, in the autumn of 2010 HENT did a new review of the state of the art of OpenBIM inspired by Rambøll, one of their design partners and their VDC advisor. The conclusion was that OpenBIM was ripe for harvesting. Solibri Model Checker has been an instrumental tool in HENT's OpenBIM deployment effort. Currently, more than 20 projects involving more than 300 people use Solibri Model Checker on a daily basis for improved project understanding and quality assurance.

## Model based design - “Lean digital Construction”

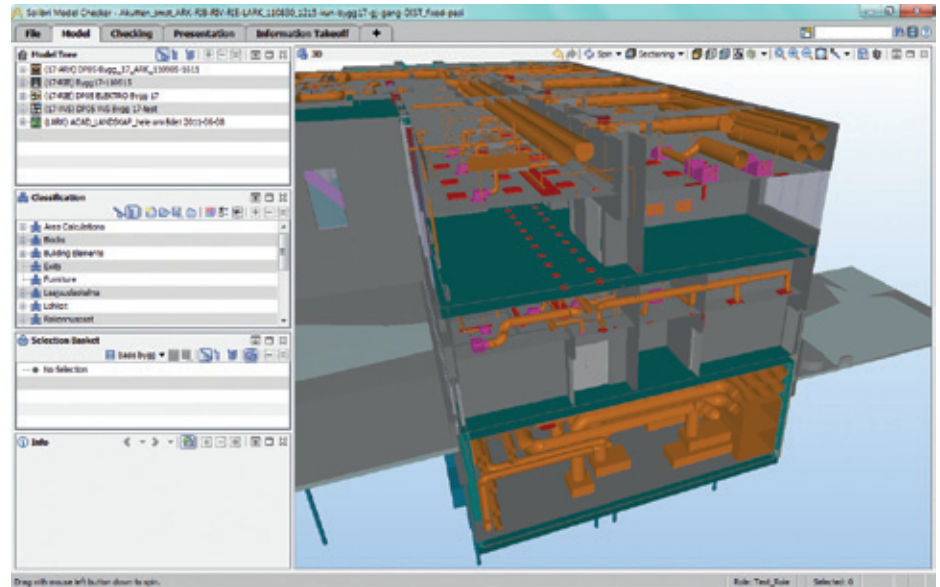
A Building Information Model (BIM) – consists of digital materials, products or objects with property information assembled into a building (model). The letters BM signifies the visual 3D model and “I” the database with property information.

The Designers get, with the help of BIM, a much better and holistic understanding of the project. However, BIM and OpenBIM usage demands that the Designers need to plan the Design Work or the digital Construction Work to a much greater extent. HENT believes that Designers can learn a lot from the construction process with regard to minute planning and organizing production processes – Lean Construction. They even think the Design Manager can be seen as a “Digital Construction Manager”. HENT has coined their VDC approach “Lean Digital Construction” or resource efficient model-based Design. What it means is that Design should be done in a smart way, utilizing Discipline specific building models, resulting in sustainable buildings delivered on time, within budget and with zero defects.

A lot of architects and consultants have used BIM within their disciplines for drawing production for many years (closed-Discipline-BIM). In HENT projects these models are re-cycled or utilized through Open-Team-BIM/IFC to create a cross-disciplinary coordination model of the given project. By building digitally or virtually - on the digital construction site - before the building is built in reality, contractors can quality assure and take away obvious design errors that normally are discovered during construction. Additionally, Open-Team-BIM is also valuable for project selling and 3D visualization. The adage “A picture is worth a thousand words” is also relevant for BIM. These are some of the reasons explaining the effectiveness and efficiency of BIM.

Because it was too time consuming and cumbersome to make 3D Models until recently, only 2D Drawings were produced and actually on some projects are still produced. What has enabled the AEC industry to take advantage of 3D modeling is the development

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DP05 cross disciplinary co-ordination model of the project.  
Source Norconsult using AutoCAD with MagiCAD and NSW using Revit Architecture.



DP05 model in Google Earth with helicopter flight corridor.  
Source HENT using Onuma and SketchUp.



Aker Solutions office building in Stavanger, early stage volume model. Source Lund Hagem Arkitekter using 3D Studio Max.

of improved software and faster computers.

The advantages of using BIM is that HENT can 1) use models and perform analysis in early stage project development evaluating different scenarios together with their customers. In Design HENT can 2) produce drawings more efficiently and effectively, 3) perform better spatial co-ordination and quality assurance, and 4) design faster. Construction can be involved earlier and contribute with insight in order to 5) improve the constructability of designed solutions. Construction can also 6) train assembly or construction workers in the Model and 7) do production simulation or 4D simulation. BIM also enables HENT to better structure the information flow on a project, so that they, through the use of BIM construct a database with information that is valuable as 8) FM documentation after commissioning.

HENT is currently among the leading construction companies utilizing BIM in Design – Lean digital Construction and in Construction – Lean Construction in Norway.

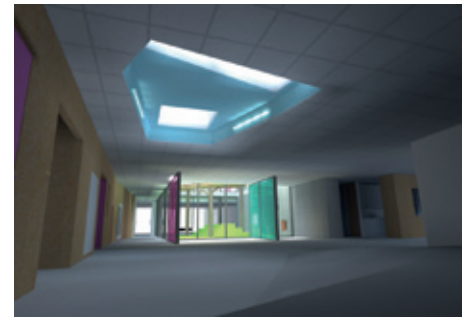
### Case Aker Solutions new Office Building in Stavanger

The Office project for Aker Solutions AS in Jåttåvågen in Stavanger has been

actively using BIM for drawing production and OpenBIM for spatial coordination and quality assurance. One of the lessons learned is the importance of defining OpenBIM usage as an integral part of the design process and not be too ambitious the first couple of times you use BIM and OpenBIM, but aim for the low hanging fruits.

The digital or virtual construction site is also a key enabler for reducing the number of construction errors due to design errors or omissions in the construction documentation.

The HENT Project Manager Thomas Grøttvik states that to execute an OpenBIM Project, as HENT does on this project, involves “*doing the construction job*” on the PC before it is done at the construction site for real. Deploying Solibri Model Checker as a Quality Assurance Tool has as an effect that at least 80 % of the design Errors and Omissions, which earlier were discovered as errors on site during construction, now are identified and solved in the Design Process. One error at the PC is much less expensive to correct, while an error at the site often involves a lot of hassles, delays and money spent. This also has as a consequence that we can manage and control the design progress much better. In addition, the OpenBIM Model is a good aid for communicating design intent and improv-



Hasleveien visualization of a play area. Source Enerhaugen Arkitektkontor AS using ArchiCAD.

ing communication and understanding across disciplines in the design team. On this project, the OpenBIM Model has also been used by the construction crews for planning actual construction work.

HENT is also building new offices for Aker Solutions in Oslo. At the two sites, in Oslo and Stavanger, Open BIM has worked as a tool for QTO control, spatial coordination, production planning and general problem solving.

### Case Hasleveien Kindergarten in Oslo

The old Foundry building at Hasle in Oslo is transformed into a 306 children kinder garden. The project is on the Cultural Heritage List so there is close cooperation with the Office of Cultural Heritage Management. The Project consists of both new construction and renovation Work.

On the project, OpenBIM has been used for drawing production, visualization and to perform environmental analysis, especially focusing on lighting.

### Case DPO5 – New Emergency Care Unit at Oslo University Hospital location Ullevål

The Health Region of Oslo (OUS HF) is being reorganized, and as part of this the emergency care unit is also being reorganized. A new unit with several operating theaters is currently being developed. The reorganized unit will be one of the largest emergency care units in all Scandinavia. OpenBIM and Solibri Model Checker have been used in the early phases in programming and for quality assurance and spatial coordination, with success. ○