

Integral design: creating breakthroughs for sustainable innovation in the building industry

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The product with the biggest impact on sustainability of humans are their buildings. The built environment uses 40% of all our energy for conditioning the buildings and 8 % of all our energy to be built. Sustainable building designs need to provide solutions for sustainability issues ranging from flexible use to renewable energy, energy reduction measures while maintaining and even increasing comfort level of the users. As complexity and scale of design processes of buildings increase, traditional approaches may no longer suffice. The present inadequate cooperation between different disciplines in the design process is a main cause of the large failure costs in the building industry. The estimated productivity loss in the Dutch building practice is about 8–10% of the total construction costs (€ 80 billion) per year.

It clearly is no longer sufficient to just merely solve the problems which arise at the level of detailing on the borderlines of disciplines. To improve this situation, changes on the three levels are required;

1. Process level – to improve the design process for all involved design disciplines;
2. Product level – to improve the final product (building as a whole, as well as its parts);
3. Organization/Culture level – to bridge the gap between ‘Art (Design)’ and ‘Science (Engineering)’ worlds, in case of the building design specifically between architects and consulting engineers (structural, building physics and building services).

To reach for all three aims, new approaches are needed to bridge the gap between the worlds of theory and practice in building industry. The main body of the paper will start with the development of the Integral Design (ID) method: a design method to support the merge of the different perspectives of all designers and engineers involved in the design process. The core of this method is the use of a process model to divide the design process in different phases and levels of abstraction. This makes it possible to focus on the different design phases and to develop specific tools to support the interactive transformation process within such a phase. As such this leads to a structuring and representation of the problem and solution space. The main aim of the ID-method approach is to improve conceptual design (the process level) in order to increase the potential for creation of innovative sustainable design concepts (the product level).

The ID-method was developed and tested in practice in cooperation with the Dutch society of Architects and the Dutch society of consulting engineers. The Institute of Dutch Architects decided, based on the acquired positive results from the evaluations of the workshop participants, to include the ID-method in their Academy for permanent profession development. An ID-method course will be facilitated by the Dutch Society for Building Services Engineers. Through this the ID-design method stimulates innovation in Dutch building industry on an organizational and cultural level. The added value of such a sustainability approach in the built environment could grow to an additional turnover of € 1.200 million a year and 22.000 jobs according to a recent study by the Economic Institute for the Building industry in order of the Dutch Building Service organization UNETO-VNI.