IDEA: The IntelliCAD-based, BIM Architectural Solution

(by 4M Support Department)

1. Introduction

IDEA is the IntelliCAD-based BIM solution, designed to meet in a very friendly and flexible way all the needs of an architect, including advanced architectural design, rendering and virtual walkthrough. IDEA adopts a modern BIM structure, totally redesigned within the framework of the "new generation" development project of 4M Suite, the integrated building design suite of 4M. Intelligent model shaping and high design accuracy are directly applied on the real 3D model of the building. IDEA embeds IntelliCAD engine, the world famous CAD alternative, keeping all the usual CAD features and functions (as they have been introduced by AutoCAD, the Autodesk's product and trademark), so that its functionality is as already known by the majority of the CAD users. On the other hand, IDEA guarantees the communication among designers, due to its compatibility with DWG files.

2. IDEA Concept

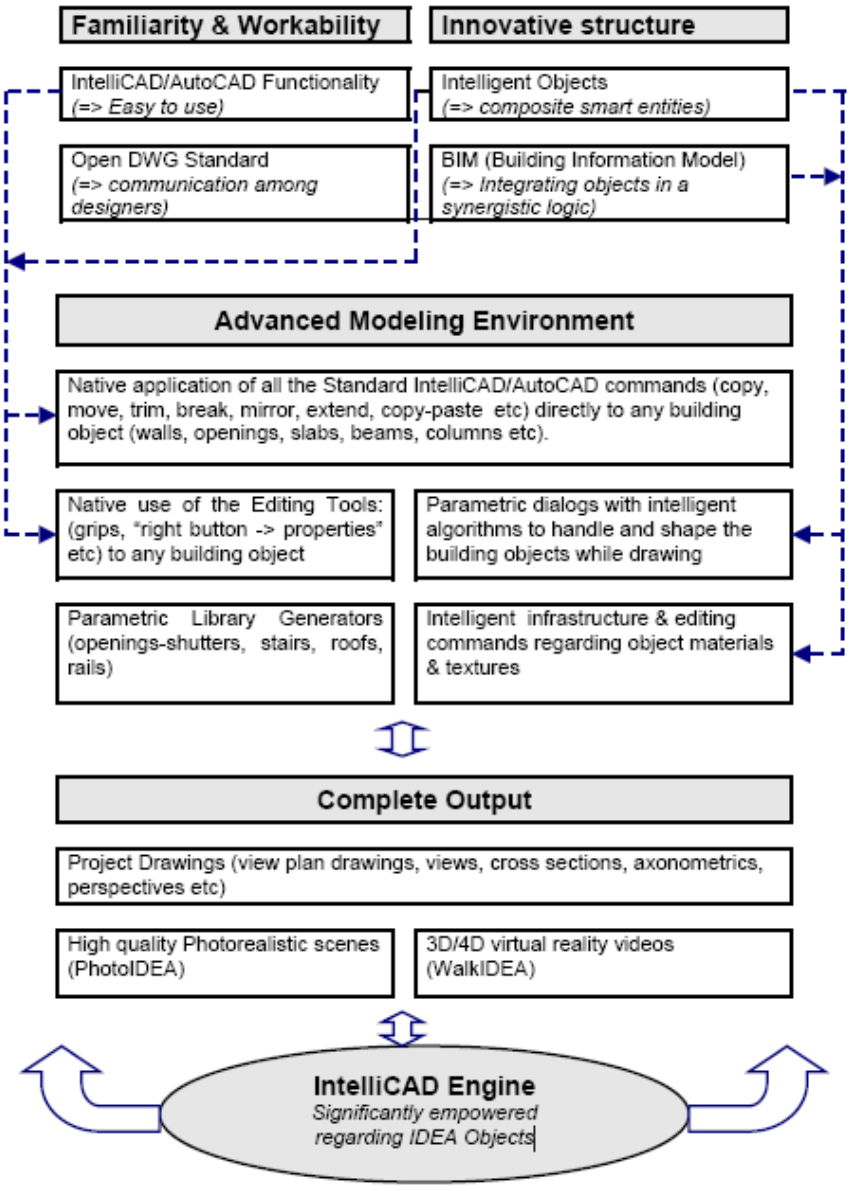
Figure 1 demonstrates the basic concept of IDEA.

Intelligent objects are handled through a user-friendly interface, constituting a very familiar and advanced modeling environment.

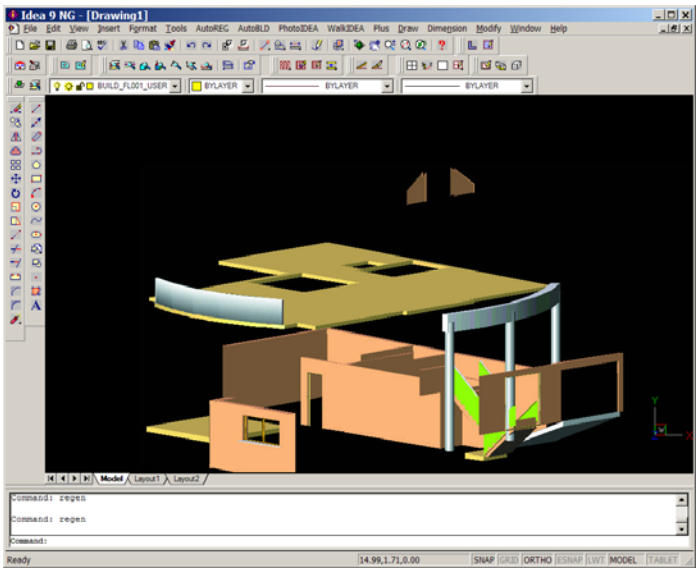
In particular, as shown in the figure, the ICAD/ACAD functionality applied on the Intelligent Objects results in the:

- Native application of all the Standard ICAD/ACAD commands (copy, move, trim, break, mirror, extend, copy-paste etc) directly to any building object (walls, openings, slabs, beams, columns etc).
- Native use of the Editing Tools (grips, "right click -> properties" etc) to every building object.

Regarding the BIM-structured composite intelligent Objects, IDEA includes:



- Parametric dialogs with intelligent algorithms to edit and shape the building objects.
- Intelligent infrastructure plus the necessary editing commands regarding object materials & textures.



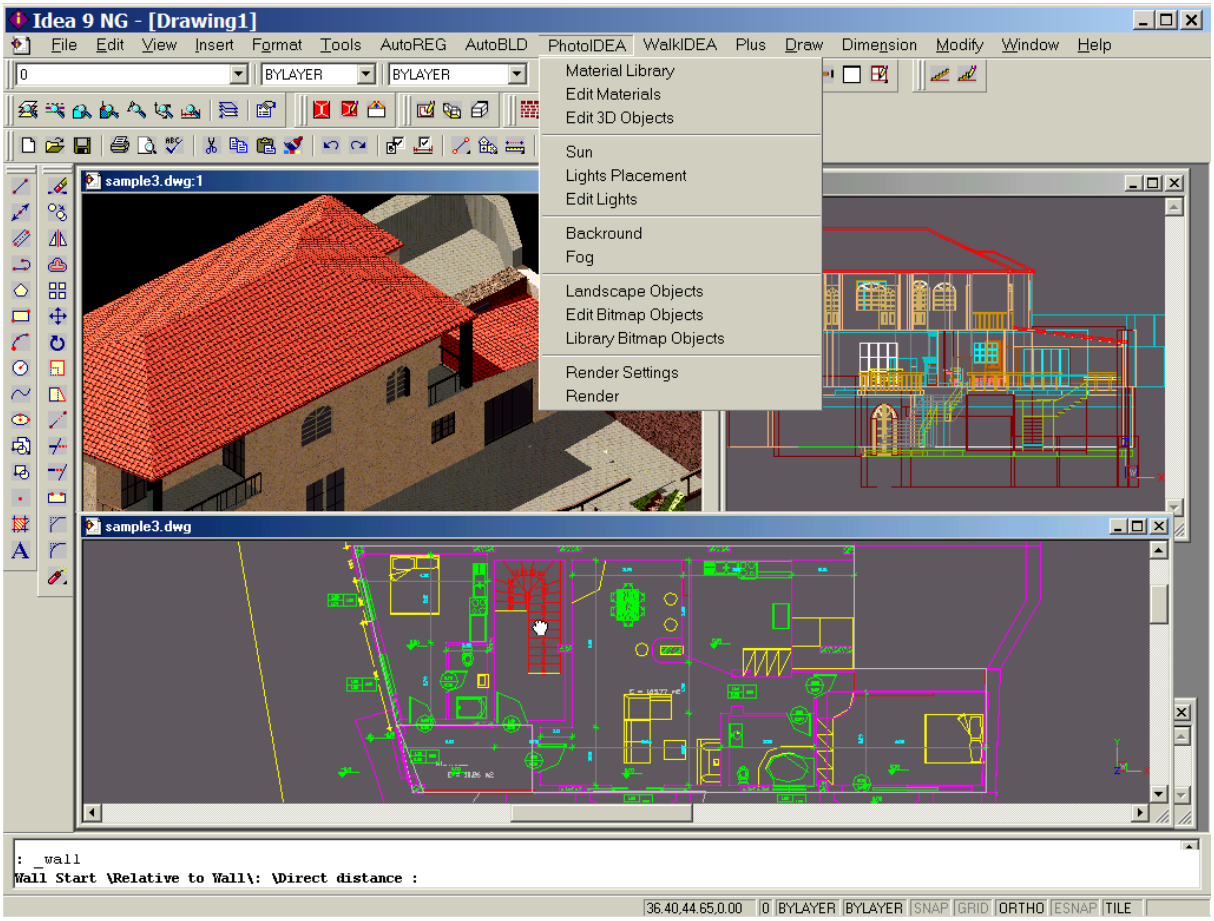
Picture 1: Intelligent objects

As a result, IDEA produces a complete output, consisting of the full set of the project drawings (view plan drawings, views, cross sections, axonometrics, perspectives etc) as well as high quality photorealistic scenes (PhotoIDEA) and 3D/4D virtual reality videos (WalkIDEA).

All the operations are supported by the latest IntelliCAD engine, significantly empowered regarding IDEA objects, in order to ensure high speed performance, even for large-size drawings.

3. Working with IDEA

In particular, the IDEA users have to do with an easy to learn, friendly, powerful and, above all, flexible building modeling tool.



Picture 2: IDEA Interface

More specifically, the main features are summarized below.

3.1 Architectural Synthesis & Design with IDEA

As far as Walls & Openings are concerned, IDEA embeds all the features required for the unrestricted "shaping" of the basic building framework, such as parallel moving of walls, trimming, extending, joining, breaking, copying, mirroring walls etc, as well as placing on them openings of any kind and type (windows, sliding, doors, openings, arches). Drawing facilities, such as the "right click -> properties" or the extended use of grips on any building object (walls, opening, slabs, columns, beams etc), speed up the design process. In addition, the real time display of the model transformations, during the modifications, enables the user to focus absolutely on the design process, thus avoiding time-consuming drawing tasks.

Regarding the “Composite Building Elements”, such as slabs, staircases, roofs, rails, gables, ramps etc, IDEA considers them as intelligent objects too, logically linked to one another so that they can properly respond and automatically update themselves to any modification. In particular, each element has its own attributes that can be edited by the user at any stage. More than simple drawing tasks, the object dialogs may also enable sophisticated drawing algorithms, ensuring the correct element shaping in every case (i.e. a freeway staircase, a complicated roof etc).

As a conclusion, the user can shape his/her model with practically no limitations, working either on the view plan, any 3D view or even on front views, cross-sections and perspectives, watching at the same time the effects of those interventions. The fact that the user deals with an "intelligent" model is due to the BIM structure of the program. Thanks to this structure, IDEA handles efficiently important aspects of the design & construction processes, such as

the bill of materials, the smart topographical functions, even the seamless integration between IDEA and each one of the other 4M Suite software solutions (STRAD & STEEL for Structural Design, FINE for the Building Services – HVAC, Electrical, Sanitary etc), all of them using and referring to the same, standard Building Information Model (4M-BLD file format).

3.2 Photorealism

PhotoIDEA supports the creation of high quality photorealistic images using a state-of-the-art "ray tracing" technology. With PhotoIDEA, the real representation of any scene of the 3D model becomes an extremely simple procedure.

Picture 3: A photorealistic example produced by PhotoIDEA

PhotoIDEA uses a rich library of real materials with texture (e.g. marble, wood, stone, carpets etc), which can be selected and adjusted properly if necessary. The fact that the attributes of the IDEA building objects include material information simplifies the editing process. Given that each part of any object (e.g. walls, frames, roofs, stair elements etc) is assigned by default to a certain material, the result of the photorealistic representation can appear on screen from the first steps of the design. The selection and editing of the materials the user wishes to use in the project, the positioning of the lighting sources, the selection of background and photographic objects and, finally, the running of the "Photorealism" command with various quality options are all performed in a friendly and fast way through the "PhotoIDEA" group of commands.

3.3 Virtual Walkthrough

WalkIDEA is the virtual Walkthrough module of IDEA, which enables the user to take a "walk" inside or outside the building model, in order to face the reality. WalkIDEA makes

“alive” the scenes of PhotoIDEA in a very simple manner: Either by using the mouse or a joystick or by defining a viewing path.

Picture 4: Walking through WalkIDEA

Any virtual "trip" can be stored as an avi file. More than a simple walk, the "WalkIDEA" group of commands also includes some supplementary effects, such as the ascension of a staircase, the option to open a door while "walking" etc. In addition, WalkIDEA can offer the experience of a 4D stereoscopic reality through a pair of stereo glasses.

4. Conclusions

IDEA introduces new standards in the AEC industry, as it proposes an effective BIM approach based on the IntelliCAD engine, offering the interface expected in fact by any AutoCAD or IntelliCAD user. In addition, IDEA achieves very remarkable performances as far as both, the model shaping capabilities and the engine speeds are concerned. Architectural design is further facilitated by high-quality photorealism plus a smooth 3D/4D walkthrough, as well as many other useful options (bill of materials, topographical component etc). Despite its numerous and impressive features, IDEA is offered at a very affordable price, absolutely complying with the "IntelliCAD school" policy.