ATHENA

The AutoCAD application for curtain wall design and façade engineering
There are two key ingredients necessary to design impressive façades that function well. The first ingredient is a capable designer with experience and a knack for technically ingenious solutions. The second is a powerful CAD application that is precisely tailored to the designer’s requirement and provides the support for professional, error free designs that require less work and are delivered on time.

This is where we call upon our AutoCAD application, ATHENA, the all-round software solution for design in

- metal and facade construction
- curtain wall and shopfront construction
- glass construction
- industrial construction
- lightweight steel construction.

ATHENA is the leading CAD based design software for curtain wall design and façade engineering on the market—and not without reason. Our software has been subject to consistent on-going development since 1989 and is used in metal construction companies, design offices and universities—in ten languages and more than seventy countries.

Matched exactly to our users' requirements, ATHENA is a complete CAD software package, offering practically everything to simplify the daily design tasks that confront the designer:

- A 2D drawing environment with practical routines and libraries for producing shop drawings (elevations, cross-sections and workshop drawings).
- A versatile 3D design section with the possibility of producing parts lists and production drawings directly from the 3D design.
- Powerful computational tools for structural analysis and building physics.
- A sheet editing program for sheet design and development.

In addition, ATHENA is independent from specific profile manufacturers’ systems and can be matched to individual needs.
Four-way versatility!

ATHENA contains four functional groups covering a range of performance for which you would have to procure four different programs.

Functional Group 1: 2D design

2D drawing functions are tuned for the rapid production of section and elevation drawings, plan views and production drawings. Numerous little helpers particularly promote productivity. For example, routines for semi-finished products, membranes, thermal insulation, welded seams or panels or the very extensive standard parts library which, apart from the illustration and labeling of the parts, also provides information on approvals and installation hints. Or the tools for the management of materials, layers and blocks. Particularly, advantageous - all ATHENA objects are intelligent ARX objects and can be labeled and edited with a double click!

A special advantage is that all ATHENA objects are intelligent ARX objects and can be edited with a double click!

Ideal for international design: ATHENA labels all the customer objects fully automatically and is able to translate a drawing into each of the twelve languages currently contained in ATHENA on the press of a key.

Functional Group 2: 3D design

The 3D design is used for the free planning of complicated geometries, such as, sloping polygon façades, pyramids, glazed roofs and bays. To achieve this, profiles or profile groups are placed over the axes of a wire model. Cut parts can be automatically computed and the components (e.g. profiles) are output with the cut parts in a parts list or in a workshop drawing.

Dedicated master data can be created, containing the profile geometries, material properties, design rules or requirements from production. Based on this master data, as well as spatial elements you can design flat elements, such as windows and doors.

The 3D design takes into account profile groups, cut parts, processes, sheet metal, glazing and also hardware. It can be displayed as a 3D view, 2D view and through any sections. The extracts can be output as parts lists or as production drawings. Optionally, an NC-X generator is available with which the NC data for profile-processing centers can be generated.

Interfaces to LogiKal (Orgadata) and ERPlus (T.A. Project) are also provided.

Functional Group 3: Sheet editing

ATHENA now contains a complete sheet editing program for the quicker design of sheets with the associated developments. Increased productivity during sheet design comprises of clearly laid-out dialog boxes for the input of basic sheet data and processes, a 3D viewer for continuous visual checks and versatile options for the import and export of drawing data.

Functional Group 4: Engineering

Always on the safe side. ATHENA’s computational functions for structural analysis and building physics are well-developed tools for the exact determination of, for example, centers of gravity and moments, thermal resistances or sound insulation dimensions. You can conveniently compute the required moments of inertia or maximum deflections. You can also carry out thermal bridge analyses (isothermal calculations). In this way thermal bridges can be eliminated during the design stage.
2D Design

Classical two-dimensional construction takes up a particularly large part of the designer’s workday routine—drawing views, generating cross-sections, drawing up detailed drawings, producing manufacturing documentation. The situation is also unlikely to change in the short term. The optimization of the work procedure with a special software solution leads to increased productivity and a higher-quality finished product. This is a big advantage for the designer who is no longer impeded by the limitations of the working tools and has a powerful assistant at his side to relieve much of the work.

ATHENA has proven its capabilities over years and the 2D section especially profits from careful maintenance and on-going development.

Numerous routines simplify the drawing of panels, insulation, membranes, welded seams, sheet or glazing cross-sections. Clearly laid-out dialog boxes gather important information and with the positioning aids the object is conveniently placed in its position in the drawing. ATHENA handles everything else.

Many vast built-in expandable libraries make light work of inserting objects into the drawing, e.g. profile systems, standard parts or screws and other hardware. Various international standards are also provided.

Dimensioning also becomes a pleasure with ATHENA: In addition to the AutoCAD dimension functions there are efficient connected dimensions, fully automatic object dimensions, level and interrupted dimensions which are also implemented by viewports in the layouts, and are carried through associatively when geometrical changes occur.

All ATHENA objects are ARX objects and can therefore be edited with a double click. Object labeling is automatically adapted for changes of dimension.

The powerful 2D tools of ATHENA increase productivity, save work time and costs plus also help the designer to concentrate on the essential aspects of his work.

Screwed assembled joint

ATHENA has a program for generating screwed assembled joints. Screwed joints consisting of a number of ATHENA parts (screw, washer, nut, hole) can be generated and also edited. Frequently used screwed joints can be saved in libraries for repeated use. Screwed joints can be inserted into the drawing in 6 different views and also as 3D objects.

Standard parts/manufactured parts

Standard parts are available in the standards DIN, ISO, EN, GOST (Russian), GB/T (Chinese) and AISC (USA) The selection of the standard parts or manufactured parts is carried out in the dialog box using illustrations or pick lists. The presentation can be influenced through the type of labeling and the display of the center lines, hidden lines, thread lines and hole center lines. Important: The parts are not “dumb” blocks, but intelligent “variants”. This facilitates, for example, the stretching of a screw in steps according to the standard. Non-standard lengths are also possible.

The number of parts is huge and more are regularly added. They can be easily handled using convenient find and filter functions. Standard parts are available in six different views and as 3D parts. Profiles (e.g. steel profiles) can be immediately adopted in 3D models.

Now new: Further information, such as for example, approvals and installation information, is available for manufactured parts.

Profiled sheet

The profiled sheet generator facilitates the fast insertion of trapezoidal or corrugated sheets from various manufacturers. The sheet parameters are defined in a dialog box.

Façade Elevations

ATHENA offers many commands for producing windows, doors and façade elevations. They can be conveniently generated and given profiles and infills retrospectively. Section generation is possible, diagrams too.
Thermal insulation
Regardless of how the insulation was created, it can be altered using grips or the stretch command, and made to fit an irregular area. The insulation depth can be specified independent of the thickness of the insulation mats. Insulation can be displayed as soft or rigid. The most varied shapes are possible: Straight, curved, wedge-shaped, annular and flat, also with islands.

Parts labeling
All parts are intelligent and can be fully automatically labeled, also bilingually. Leader texts are adapted automatically when the labeled part is modified. Editing is also child’s play.

Sheet metal section
You can create material specific sheet metal sections. The limbs can be straight or curved. With the sheet development routines the cross sections (also of composite panels) can be developed material-dependently. Sheets can also be used fully automatically for 3D models.

Management of filling properties
The management of any type of filling, e.g., glass, metal panel or stone, occurs in a dialog box. The filling properties can be saved in a data base and then used in any drawing of the 3D module. Complex infill, such as coated or offset glazing, is possible.
3D Design

Never before was the three-dimensional design of curtain walls so easy. Sloping polygon façades, pyramids, glass roofs, bays and other complicated geometries can be quickly generated without complication.

As a basis for the production of extensive 3D designs an axis model is used, to the axis lines of which single profiles or complete profile groups can be placed. With a simple function an analysis of the axis model can be carried out in which also the external side is defined. Thereafter ATHENA recognizes all the angles, field quantities and alignments within the axis model. Consequently, in conjunction with the application of the designer’s own assemblies a high level of automation can be achieved. For example, you can create a mullion and transom façade with all cut parts at inconceivable speed.

Just a few working steps are necessary to provide a complete axis model with profile groups incl. joint components and hardware, to intercept nodes, to set infills, such as glazing or panels, and to generate production drawings or parts lists. There is also the possibility of assigning profile groups and assemblies in the form of joint components, drilled holes or other parts or processes which ATHENA can automatically transfer to bar joints in the 3D design and output them.

The ATHENA 3D functionality is orientated for designing a complex three-dimensional facade and preparing it for production. Interfaces for transfer to cost calculation and ERP/PPC systems are available. A new feature is an optional NC-X or SAT output for production.

Glazing

A glazing assembly with cover section, insulator and rubber seals can be composed separately from the basic design. Mullions or transoms can be assigned to this assembly in the 3D design, which is particularly advantageous when different mullion and transom profiles are used in the façade, but the glazing is always the same. Also different mounting thicknesses can be realized in a façade.

Infills

Any infills can be generated which can consist of different layers, e.g. panels. These infills are assigned to boundary objects, such as transoms and posts, by means of freely definable insets. Stepped-edge glazing is also possible.

Assemblies

Apart from bar-shaped 3D assemblies (e.g., profiles) and area objects (e.g., glazing or panels), now local assemblies, i.e. joints and processes such as glazing retainers, can be generated. All ATHENA standard parts (screws, nuts, etc.), holes/elongated holes, sheet cross-sections and customized contours can be applied. The assemblies can be positioned on 3D profiles singly or according to a grid. The parts of the assembly (projection) of the the assemblies are ordered according to the profile or the infill, which facilitates a detailed evaluation.

Create profile groups

The Bar Assembly Manager facilitates the grouping of a number of profiles to form an assembly, e.g. a transom with sealing strips, insulator and cover section. Within a profile group, the components can be modified or reassigned. Also, the components can be rotated and mirrored, and the insertion points can be displaced.

Simplified Display

The profiles can either be displayed in full detail, or simplified. There are four different display levels. The simplest display (rectangles) reduces the file size to 1/15th, and the working speed increases correspondingly.

Bar diagram

The profile diagrams can be produced after carrying out the automatic profile cut parts (e.g. profiled or mitered). A 2D production drawing of the profile numbers and job data is automatically produced fully dimensioned.
Apart from bar-shaped 3D assemblies (e.g., profiles) and area objects (e.g., glazing or panels), now local assemblies, i.e., joints and processes such as glazing retainers, can be generated. All ATHENA standard parts (screws, nuts, etc.), holes/elongated holes, sheet cross-sections and customized contours can be applied. The assemblies can be positioned on 3D profiles singly or according to a grid. The parts of the assembly are also positioned during the 2D evaluation (projection) of the 3D profiles. In the structured parts list the assemblies are ordered according to the profile or the infill, which facilitates a detailed evaluation in ERP systems.

Create parts lists
Parts lists can be created directly from the 3D drawing from all parts used in the construction. Infill lists and bar lists, including raw and cut lengths of the profiles, can be created. Here, tagging is employed, i.e., even complex 3D parts receive the same label if they are identical and the quantity is incremented. The lists are created in MS-Excel format.

NC-X or SAT export (optional)
These two optional programs can be used to generate NC data for ATHENA 3D profiles in NC-X format. In addition to all geometric information such as blanks and machining, the NC data contain order and part order information and are used for production, e.g., on a profile processing centre. On the other hand, SAT files can be output from ATHENA 3D profiles, which can also be edited on a profile processing centre using a postprocessor.

BIM interface
ATHENA includes a BIM (IFC) interface. IFC stands for "Industry Foundation Classes" and in construction it is the standard for the description of digital building models, also known as BIM (Building Information Modeling). Using the interface it is possible to transfer ATHENA 3D facade models to so-called BIM programs, such as for example, Autodesk Revit, and, say, to carry out collision checks with other project subsections. Along with the 3D objects, job-specific data, such as item or position numbers, etc. are also transferred. Also, objects can be transferred from Revit to ATHENA and then be fitted with profiles, infills, sheets, etc. These can then be returned afterwards.
Sheet editing

ATHENA contains a complete sheet editing program for the quicker design of sheets with the associated developments.

Basic data, for example, sheet thickness and bending radius, form the basis of the sheet to be designed. The basic shape is applied to the sheet via a dialog box or from a free ATHENA sheet contour. Then, the various edges are set and copied in the easiest way to adjacent or opposite sides.

Many different types of joint are available for the folds. Folds appended to a primary surface can be cropped and beveled with an angle.

Visual checks of the sheet shape via the dynamic 3D viewer ensure error-free working.

Holes or punch-outs can be set in the sheet body at any time. There are basic shapes such as circles, rectangles or free contours available for this purpose. Customized contours can be generated and saved in a library for reuse. The editing processes can be set absolute or associative and also rows of punch outs are possible.

The description of the joint formation, which is important for the development, is easily entered in a dialog box, e.g. the gap dimension and nature of the corners of the fold. The computation of the development occurs according to the factor tables normally used in metal construction and can be saved as required.

The produced sheet can be inserted into the drawing as a development or 3D model. The development can also be saved as a DXF file or transferred to MS Excel.

Composite Panels

Apart from normal sheets, composite panels can be processed, e.g. Alucobond and Reynobond. Various types of joint are also available.

The advantages of the sheet editing program are summarized below:

- Any primary surfaces, folds, processes, separations and types of joint.
- Sheet generation by accepting a 2D cross-section or directions in a dialog box.
- Continuous visual checks via the 3D viewer with zoom/pan functions.
- Development computation via factor tables as is used in metal construction.
- Sheets are managed in libraries (order, partial order, etc.).
- Development produced automatically in DXF format for NC machine control.
- Fully compatible to ATHENA 3D.
- No procurement of additional “sheet-development software” is required unless the processing involves extremely complex metal sheets.
Array Division
With the function “Array Division”, any area can be divided into uniform rectangles at any angle with a definable starting point. This function is very versatile; typical applications include wall and ceiling panels, element facades, shaped sheet metal facades, raised floor panels and many more. The output could be a position plan, parts lists or individual part drawings.

Placement plan for profiled sheets
This new tool enables the fully automatic placement of profiled sheet-metal panels within any outlines, e.g. of walls or roofs, and the detailed output.
A sheet placement plan with labeling is generated from the specification of the placement orientation (horizontal or vertical), the choice of a profiled sheet from the ATHENA database and an outline via two diagonal corner points. During this process, overlaps, tolerances and sheet thickness values can be determined. With just one step, a parts list, in which identical parts are summarized, can be output from the sheet placement plan. The sheets can be converted to 3D objects with the command “Object to solid body” – for example, to use them in a BIM project.

Stair
The „Stair“ module facilitates the design of a stairway and the subsequent output of the single parts. The output can be provided both in 2D and in 3D and comprises the plan, pitch line, stringers and steps. No further stair software is needed for the design of stairs!
**Centre of Gravity and moments**

This command calculates the center of gravity, moments of force, centroid axes, radius of inertia, cross-section information such as area, external outline and the weight of one or more profiles. The center of gravity is marked and automatically dimensioned. This is ideal for the iterative process of creating custom project-specific profiles.

**Thermal resistance**

Establishment of thermal resistance values of chosen assemblies. The assemblies can be made of several layers (materials), which can be chosen from a freely extendable library.

**Load-case structural analysis**

With this static program, load case calculations of bars can be performed by selecting the high degree of freedom conditions. The requirements and/or conditions are defined in a dialogue box. The results can be inserted as a report in the drawing. The functions are as follows:

- Any number of supports
- Different types of bearing
- Any combination of loads (point and linear loads)
- Differentiation of usable load and permanent load
- Check of the entered values for requirements and reliability.
  - Inclusion of safety factors (also freely definable)
  - Indication of whether requirement criteria are satisfied
  - Percentage figure for load factor
  - Computation of the buckling stress and buckling force
  - Report: Computation results as table or graphs (e.g. max. deflection, max. stress in the cross section, reaction forces, etc.)

**Rw – Estimated sound insulation factor**

With this routine the sound insulation factor can be roughly determined for a construction. A results table can be optionally inserted into the drawing.

**Ucw – Mean thermal transmission coefficient**

With this command the mean thermal transmission coefficient of a window or a facade can be calculated. A results table can be optionally inserted into the drawing.

**Panel / solid thickness calculation**

Thickness calculation for a panel or solid body under a defined loading case. The Bach plate formula is used as a basis for the computation.
Interfaces

ATHENA has an interface to ERPlus with the following functionality:

• ATHENA standard parts (e.g. standardised parts) can be synchronized with ERPlus and queried (e.g. for stock availability).

• From a 3D model constructed with ATHENA, the parts (bars, fillings, small parts) can be transferred to ERPlus.

IFC interfaces (BIM)

Using the proprietary IFC interface, it is possible to transfer ATHENA 3D models (glass roofs, façades, elements, etc.) in the desired display quality (LOD) incl. all relevant information to a BIM-capable application, e.g. Revit or Navisworks. Non-graphical parts can also be transferred. ATHENA is thus ideally suited for the BIM process.

Interface to ERPlus

ATHENA has an interface to ERPlus with the following functionality:

• ATHENA standard parts (e.g. standardised parts) can be synchronized with ERPlus and queried (e.g. for stock availability).

• From a 3D model constructed with ATHENA, the parts (bars, fillings, small parts) can be transferred to ERPlus.

Element interface to LogiKal and ERPlus (plane elements)

ATHENA users now have a tridirectional interface available with which ATHENA, LogiKal and ERPlus can be linked in real time. The special feature here is that all three products access the same data version. A change in a façade element in one of the programs leads to an automatic update in the other two programs, irrespective of whether it is a change of profile, fields (e.g. Turn/Tilt to Turn), geometry or quantities. This saves an enormous amount of time and sources of error are eliminated.

LogiKal construction interface (3D models)

Using LogiKal frame master data, complex and smart 3D models can be created in ATHENA. After completion, it is possible to transfer them to LogiKal and to evaluate them there.

Optionally, the 3D models can be supplemented in ATHENA, for example the substructure, wall connections, sheets, etc., and then transferred via the IFC interface to a “BIM application” such as Revit or Navisworks.

Revit App for BIM (optional)

The Revit app “Family/DWG Exporter Importer” was developed to facilitate an easier and faster BIM data interchange between ATHENA and Revit. This plugin is used when, for example, in the Revit architect’s plan, the window/ façade elements are already available as “dummies” (rectangular frames). They are then transferred to ATHENA in a type-oriented manner, where they are converted to “real” smart façade elements and then transferred back to Revit according to their type. Here, types are exchanged for the same type. The “transformed” elements are evaluated in ATHENA.

ATHENA - the solution for curtain wall design and façade engineering.

- Independent of profile system
- Easy to learn
- With a high general validity
- For engineering design, i.e. not only drawing, but also arithmetic (statics, isotherms, etc.) and modelling (3D)
- Excellent list of references!
- Leads the market for design programs for metal construction under AutoCAD, therefore a sound investment.
- Independent of language. A change of language is possible even during the design. The following languages are available:
  - German
  - English
  - French
  - Italian
  - Dutch
  - Spanish
  - Czech
  - Polish
  - Russian
  - Chinese

System requirements
AutoCAD under Windows
Please find the current requirements online: www.cad-plan.com/systemrequirements

Hardware:
ATHENA requires the same hardware configuration as AutoCAD.

AutoCAD, Revit, Navisworks – registered trade marks of Autodesk Inc.
Windows, Excel – registered trade marks of Microsoft Inc.
LogiKal – registered trade mark of ORGADATA AG
EPRplus – registered trade mark of T.A. Project GmbH

More information at www.cad-plan.com

CAD-PLAN GmbH
Hanauer Landstrasse 174
60314 Frankfurt
Germany
Tel. +49-69-800 818-0
info@cad-plan.com
www.cad-plan.com