Windows as Renewable Energy Sources for Europe
Window Energy Data Network

Project supported by DG for Energy and Transport of the European Commission

www.windat.org

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Press Releases of WIS version 3.0 - English version

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This document was produced within WinDat, with active contribution by the members of this European Thematic Network. See www.windat.org for more information.

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Introduction

For the promotion of the software, apart from the website, it was decided to prepare **press releases** to be distributed across Europe.
Two versions for the press releases were prepared in English, a short description of the software, and a more detailed technical article.

These press releases are translated to most European languages, including some of countries that are not represented in WINDAT, and some newly associated states.

The distribution of the press releases is achieved with the collaboration of all partners, with the help of a database with representative journals compiled by UCD and updated by partners in the different countries.

This document gives the English versions of the two press releases.

The **annex** lists the persons/organisations responsible for translations and national distribution.

The translations and distribution is planned for May-September 2004.

EMBARGO:
This press release shall not be published before June 1, 2004

WIS 3.0: FREE EUROPEAN SOFTWARE TOOL FOR THE CALCULATION OF THE THERMAL AND SOLAR PROPERTIES OF WINDOWS

Windows strongly affect building energy use. By using energy efficient windows we can greatly reduce the heating consumption of a building, while providing a healthy indoor environment, avoiding downdraught and cold surfaces. Windows with proper solar shading provisions contribute to a comfortable indoor environment in summer conditions. Windows also play a key role in providing adequate daylight, which is another important factor for comfort and energy savings in buildings.

WIS 3.0 is a uniform, multi-purpose, European-based software tool designed to assist in determining the thermal and solar characteristics of window systems (glazing, frames, solar shading devices, etc.) and window components. The tool contains databases with component properties and routines for calculation of the thermal/optical interactions of components in a window.
The WIS algorithms are based on international (CEN, ISO) standards, but WIS also contains advanced calculation routines for components or conditions where current standards do not apply.

WIS 1.0 (the first version of WIS), previously developed as a licensed tool under a European Commission-funded research project, has been upgraded to WIS 3.0 during the last three years within the European WINDAT Network, which includes 40 leading research and educational organizations, industries, consulting engineers and designers, including a strong representation in relevant international standardization bodies.

This tool is collectively supported and used in research, industry, standardisation, education and design throughout Europe to compare, select and promote innovative windows and window components to maximise energy savings and improve indoor comfort.

WIS 3.0 tool is now freely available, and is designed as a user-friendly tool, prepared for a wide variety of users including:

- Consulting engineers
- Manufacturers
- Building designers
- Researchers
- Those involved in standardisation, building regulation and education.

For more information, support, and free download of the tool:

www.windat.org

WINDAT and WIS were financially supported by the European Commission Directorate General for Energy and Transport.

EMBARGO:
This press release shall not be published before June 1, 2004

WIS 3.0: FREE EUROPEAN SOFTWARE TOOL FOR THE CALCULATION OF THE THERMAL AND SOLAR PROPERTIES OF WINDOWS

INTRODUCTION

WIS is a uniform, multi-purpose, European based software tool designed to determine the thermal and solar characteristics of window systems (glazing, frames, solar shading devices, etc.) and window components.

It is a user-friendly and very powerful tool, prepared for a wide variety of users including: consulting engineers, manufacturers, building designers, researchers and those involved in standardisation, building regulation and education.

The WIS tool, which first version was previously developed as a licensed tool under a European Commission-funded research project, has been upgraded during the last three years within the European WINDAT Network, which includes 40 leading research and educational organizations, industries, consulting engineers and designers, with a strong representation in relevant international standardization groups.

The WIS algorithms are based on international (CEN, ISO) standards, but WIS also contains advanced calculation routines for components or conditions where current standards do not apply.
In this way WIS will contribute to the further international standardization and harmonization of window products.

WINDAT and WIS were financially supported by the European Commission Directorate General for Energy and Transport.

WIS DESCRIPTION

WIS combines the most advanced calculation routines with a user-friendly interface that runs under Windows 98, Windows 2000, Windows NT and Windows XP. Figure 1 gives an impression of the WIS structure. Windows are composed of a transparent system, a frame and spacer. All can be selected from an elaborate database with component data. Transparent systems are made up of layers. Each layer is chosen from a database with specular glass layers, scattering layers (such as blinds and diffusing glass) and gas fills. Air exchange between layers and the environment or between mutual layers can be modeled by free or forced convection.

Important new features compared to version 1 are:

- The component databases are filled with a large number of components (hundreds of glazings, dozens of shadings and frames and spacers)
- The calculation routines are adapted to the newest CEN and ISO standards
- New data can easily be imported when it comes available and glazing data can also be imported from other sources (older WIS database or the International Glazing Database)
- The linear thermal transmittance of frames and spacers can be determined with 3 different methods
- The optical properties of scattering layers can also be determined with a built-in ray tracing module as an addition to the existing view factor method
- As an addition to venetian blinds WIS can also model pleated blinds, roller blinds and screens and other diffusing devices

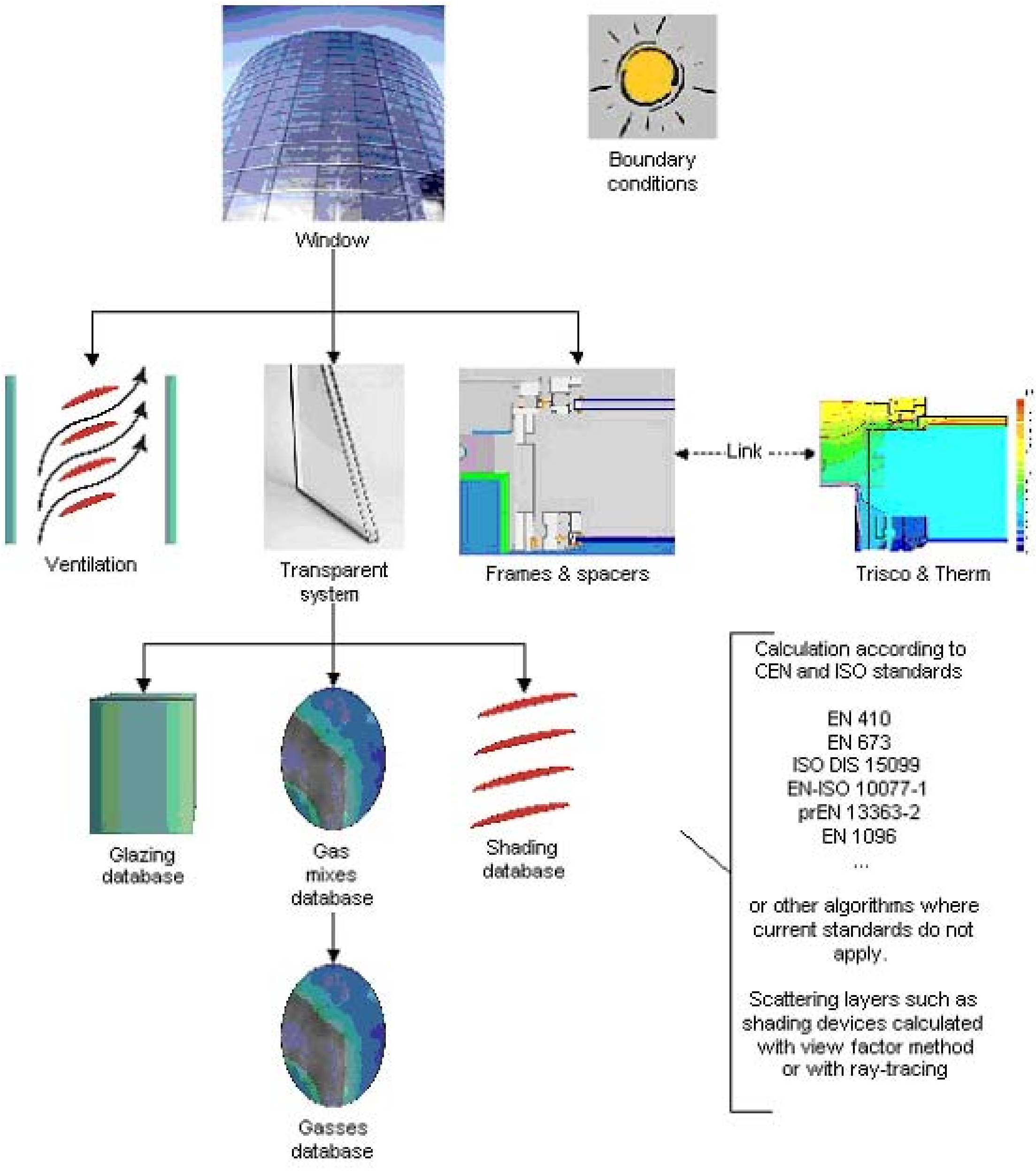

Figure 1 - WIS structure

Some features of the various WIS components are given next.

GAS FILLS:
WIS includes a database with the physical properties of a number of gasses often used in double glazed units, such as air, argon, krypton, etc. The user can create any mixture by mixing 2 or more different gasses. WIS will automatically calculate the physical properties of the mixture needed to determine the insulation value (U-value) of the window, see. The gas properties of the standard gasses are given according to EN673. The properties of gas mixtures are volume weighted, also according to EN673.

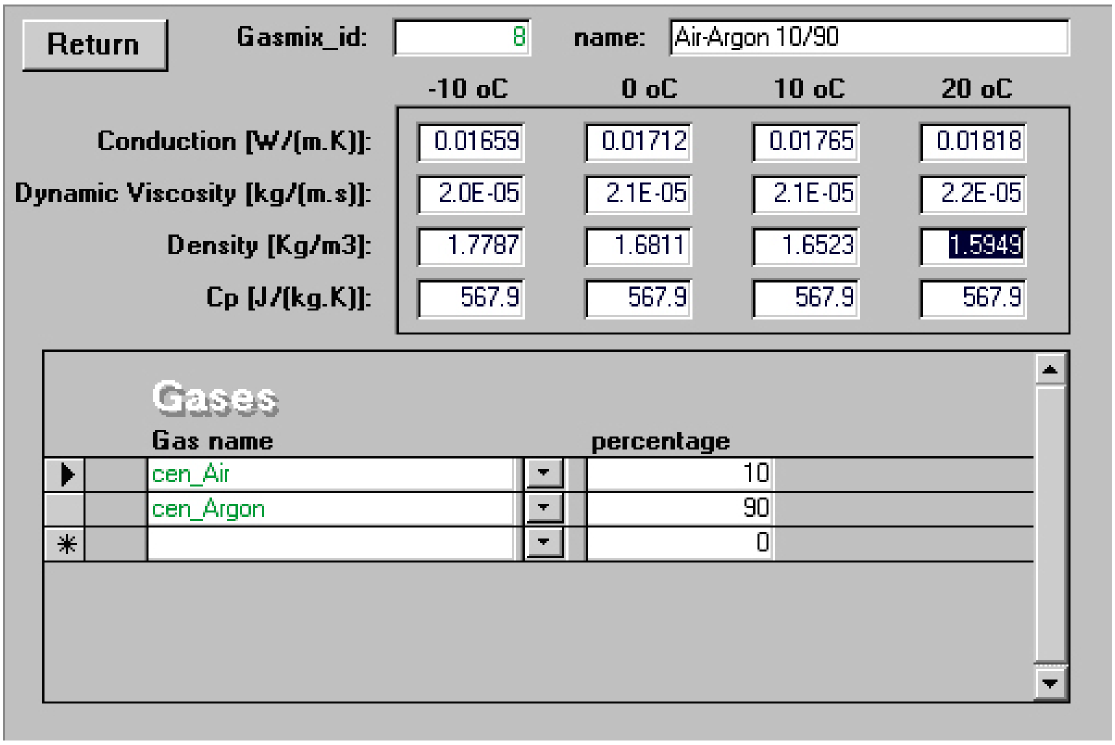

Figure 2 – WIS screen dump: gas mixes.

SPECULAR PANES:

WIS offers the full spectral data for panes in an extended database with products from different manufacturers. The pane data that is officially submitted to the WINDAT network and reviewed according to the WINDAT guidelines is marked by the letter ‘E’ and protected. The user can furthermore import his or her own spectral data e.g from measurements or from the International Glazing Database. WIS calculates a number of optical properties such as the solar, visual and UV reflectance and transmittance values, according to EN410. Angle dependant properties can also calculated according to appropriate algorithms, see figures below.

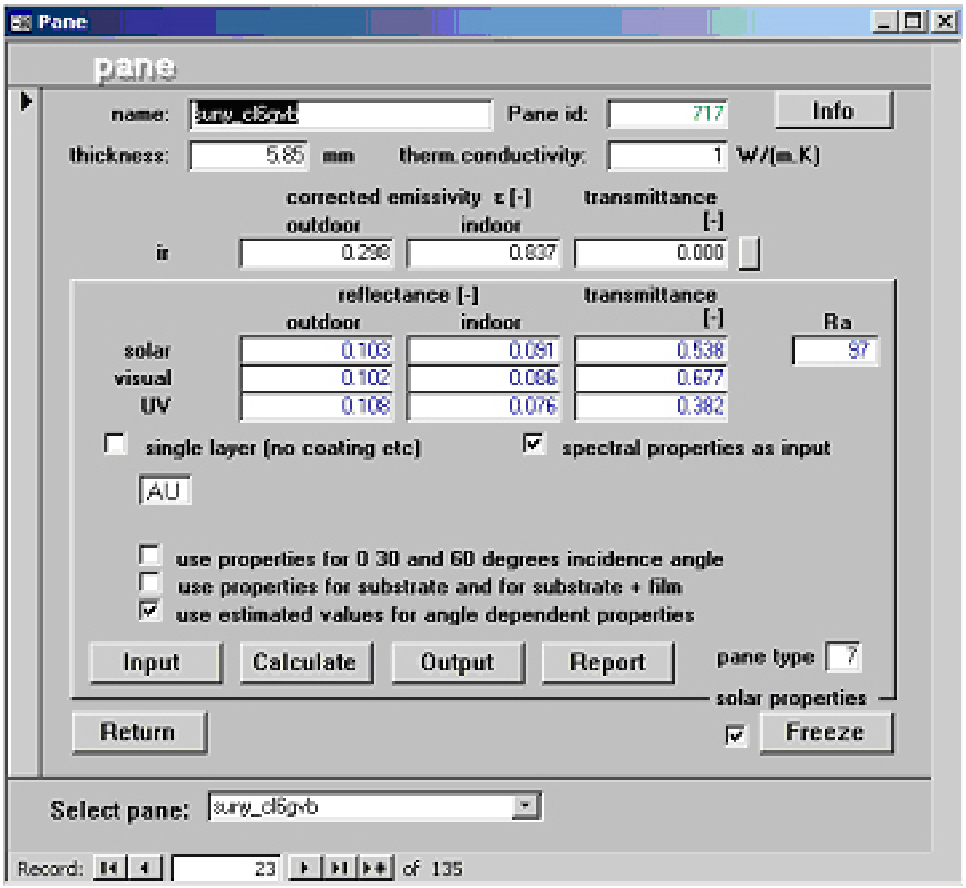

Figure 3 – Glass selection screen

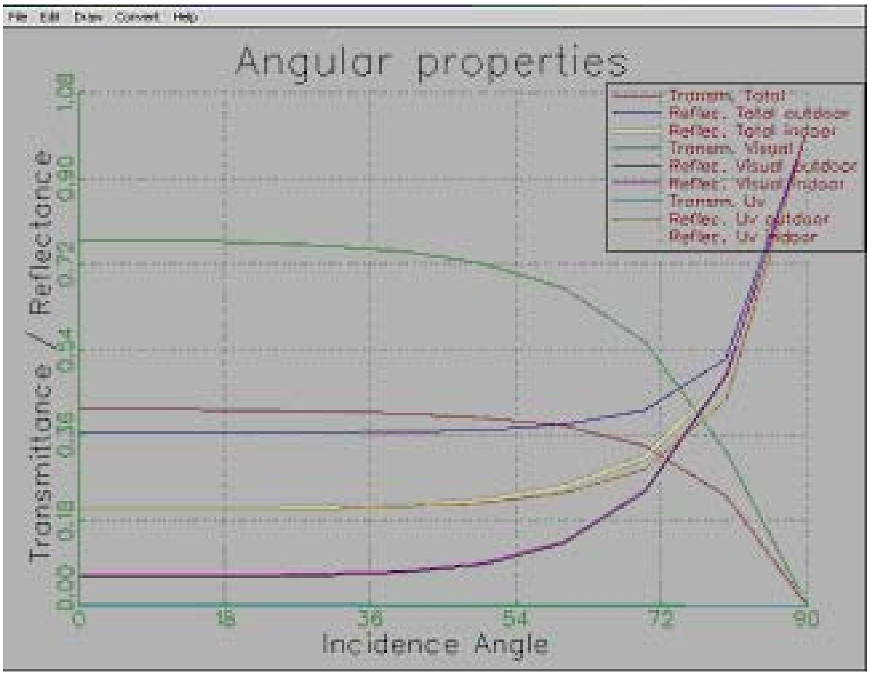

Figure 4 - Angular properties of selected glass

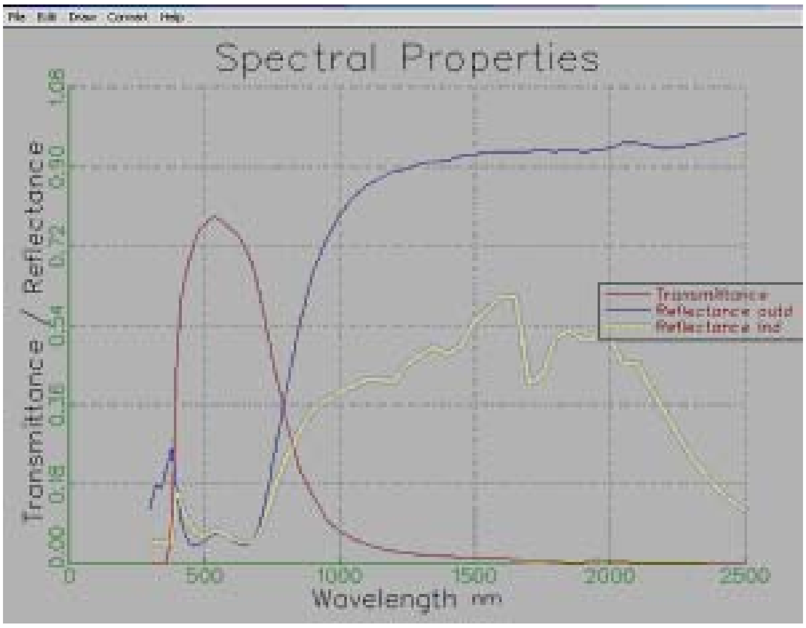

Figure 5 - Spectral properties of selected glass

SCATTERING LAYERS:
Scattering layers form a special category in WIS. In the new version of WIS four different types of scattering layers are distinguished:

1. Slat type blinds (such as venetian blinds)
2. Pleated blinds
3. Roller blinds and screens
4. Other scattering devices such as diffusing glass

The database contains the measured spectral properties of various products (mainly shading devices) and the user can import his or her own data (e.g. from measurements) into the database. The properties that are used are the normal incidence beam to beam reflectance and transmittance and the normal to hemispherical beam to diffuse transmittance.

For venetian blinds and pleated blinds WIS calculates the blind properties from the material properties, including all inter-reflections between the blinds. The blinds may be partly transparent.
The properties of pleated blinds are always calculated with the built-in ray-tracing module. For venetian blinds WIS offers the choice between ray-tracing calculations or the view factor method. Although much faster, the view factor method assumes that all slat reflections and slat transmissions are diffuse, which can be an incorrect assumption for blinds that are specularly reflecting.

The ray-tracing option is a much better choice for blinds that are highly specular, as can be seen in Figure 6. In this figure, the reflection of normal incident light of a shading system with blinds under 45 degrees angle is shown. The blinds are assumed to be specularly reflecting. Under these circumstances the layer should have zero reflectance for light at normal incidence and smaller angles, because all incident light that is reflected on the top side of one blind will be reflected at the bottom side of the second blind and transmitted forward. However, the view factor method assumes diffuse reflectance and thus some light will be reflected backwards. *Note: at an incident angle of +90 or –90 degrees all light is assumed to be reflected (reflectance at grazing incidence).*

Another new feature (only with the ray-tracing method) is to calculate the properties of curved slat type blinds. This type of blinds is very popular because of their light re-directing properties. For the user modeling the slat curvature is simply done by setting the curvature value (known as crown height) to the appropriate value and WIS will do the rest, see Figure 7.

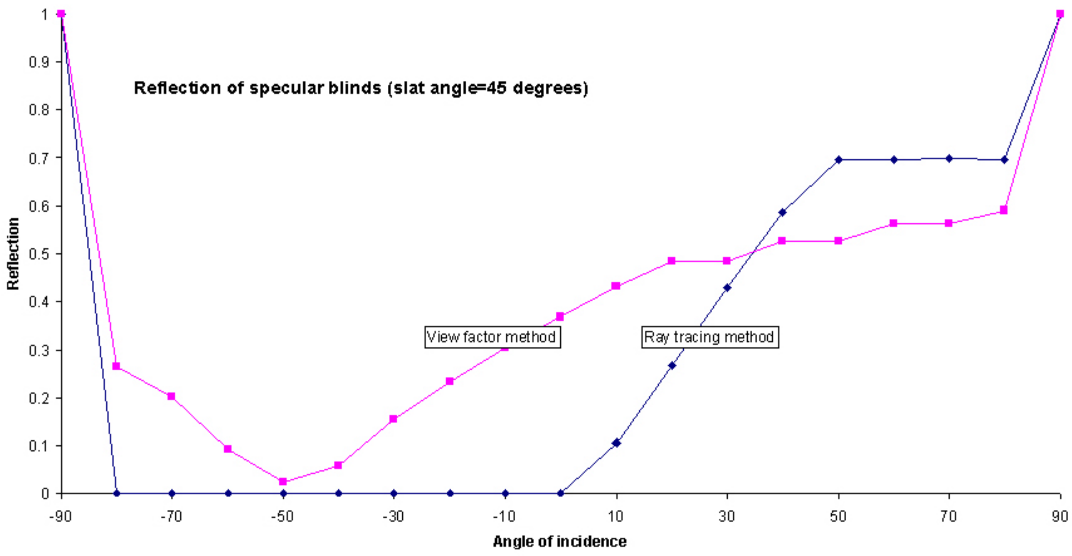

Figure 6- Calculated reflection of slat shading system (slat angle 45 degrees, specularly reflecting) with view factor method and ray tracing method).

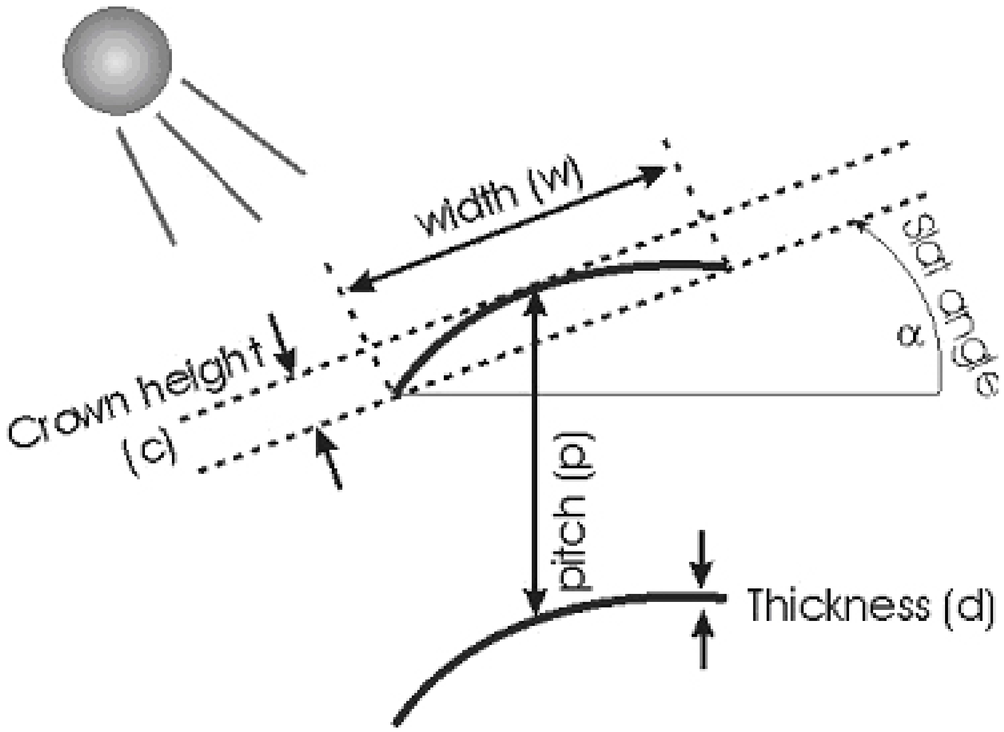

Figure 7 – Geometrical definition of curved slat type blinds.

FRAMES AND SPACERS

WIS contains a database of frames with their width and U-value as the principal properties, according to EN ISO 10077-1.New entries of frames with these properties can be easily added.

For a detailed analysis of frames, WIS provides the link to steady state numerical calculation tools (THERM and KOBRA).

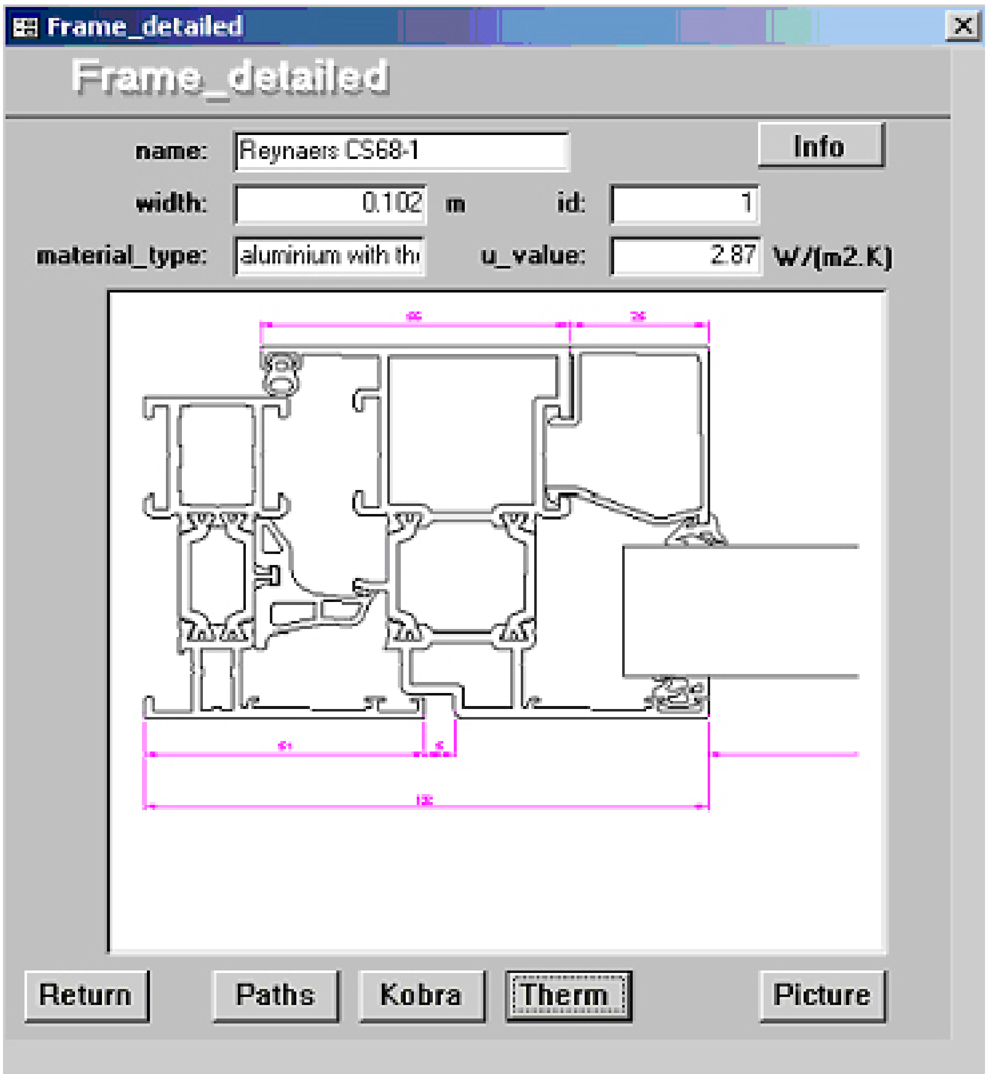

Figure 8 – WIS screen dump: frames

Spacers properties of some typical spacers are also stored in the WIS database.

TRANSPARENT SYSTEM

The panes, gas filling and shading devices of a window system are put together into a transparent system. In WIS all 'solid' layers (panes and scattering layers) are assumed to be separated by a gas (mix) layer. A laminate is assumed to be one solid layer. The optical and thermal properties of the transparent system are calculated according to EN410 and EN673 when no shading layer is included. When a shading layer or another scattering layer is included or when air exchange is included all calculations should be performed in expert mode. In this mode WIS uses some powerful algorithms, which are not (yet) standardized. Systems with inside air circulation (ventilated systems) and shading layers will then be calculated according to ISO DIS 15099 and (where applicable) to prEN 13363-2. Following (and contributing to) the latest drafts of these standards, the current calculations in WIS “are as close as possible to the physical reality and as close as possible to the standards”.

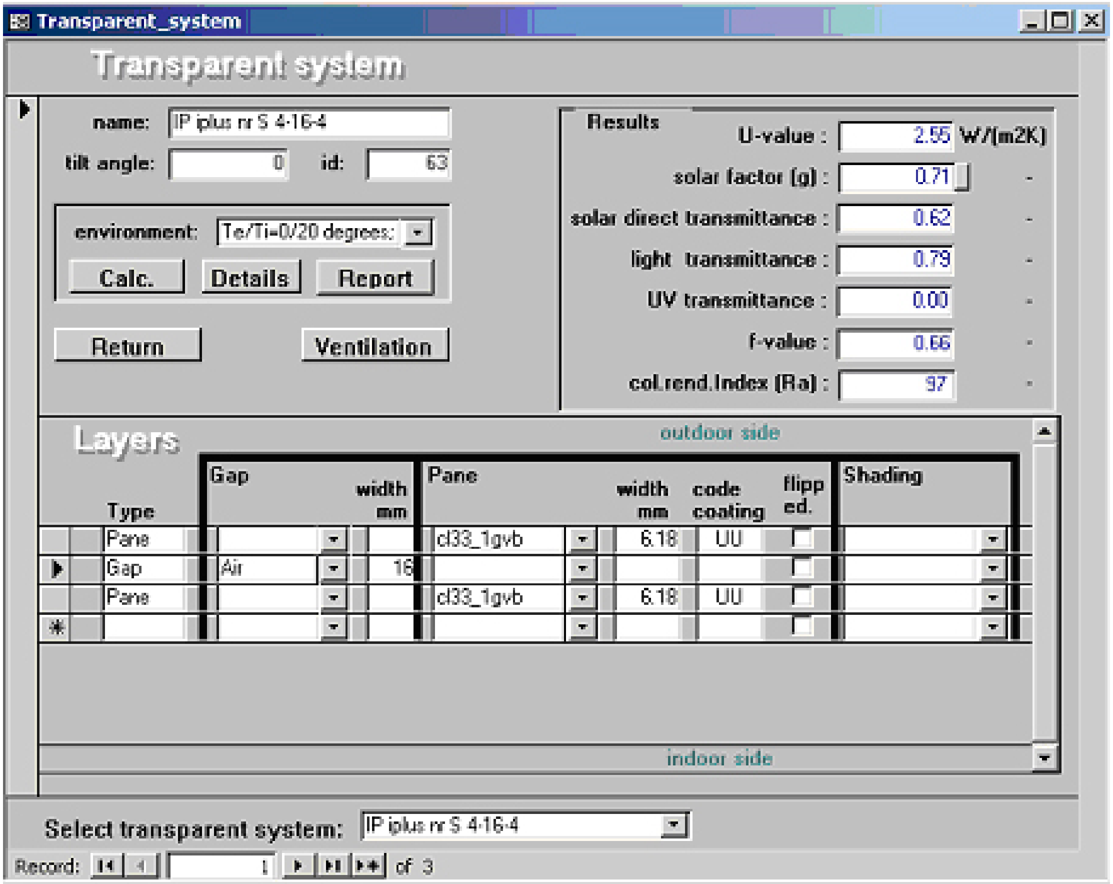

Figure 9 – WIS screen dump: transparent system

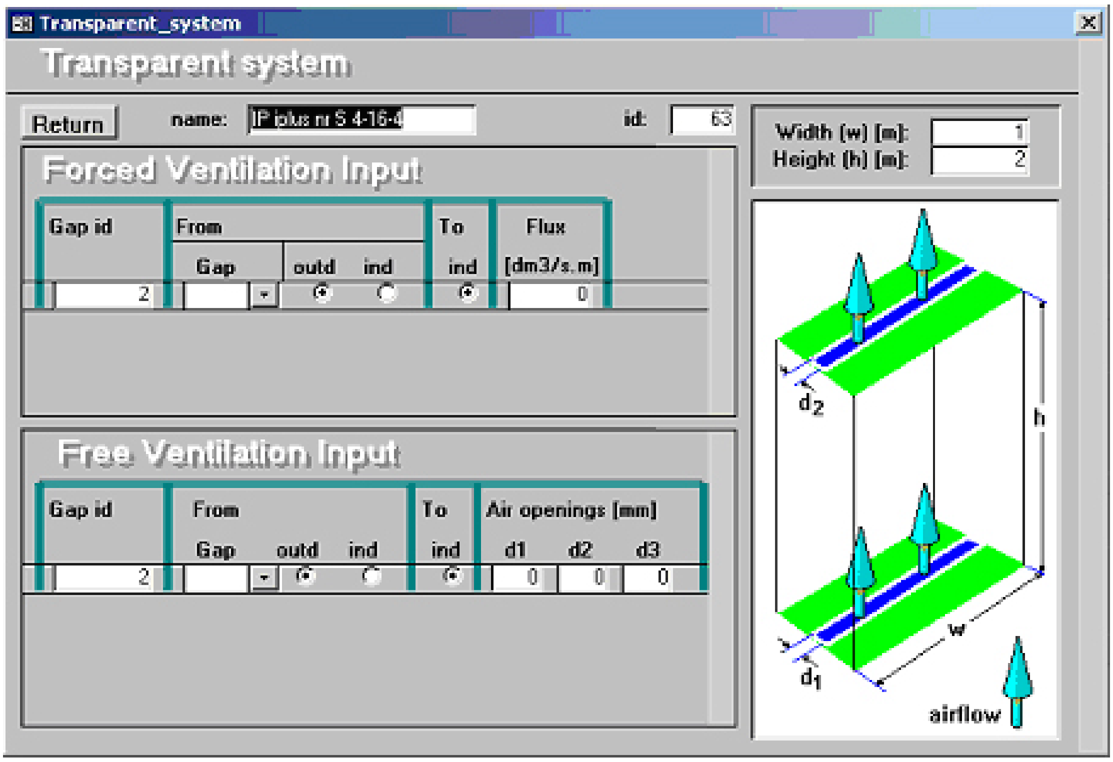

Figure 10 – WIS screen dump: ventilation models

With these special features, the WIS tool is particularly suited to calculate the thermal and solar performance of complex windows and active facades.

WINDOW SYSTEM

In this screen, the window system is composed from transparent systems and frames defined in the previous forms. This final stage defines the complete window system and leads to the final calculations and the results for the whole window system.

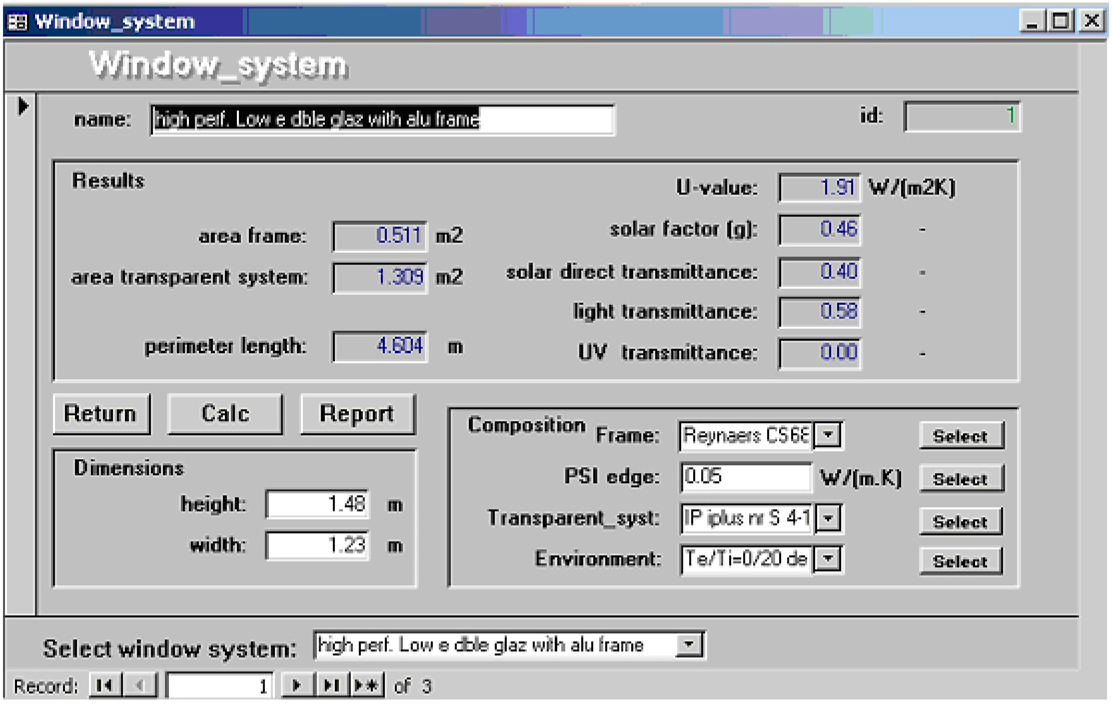

Figure 11 WIS screen dump: window system

For more complete information, reports with all the detailed results can be accessed from the individual forms.

CONCLUSION

WIS combines a user-friendly interface with the most advanced calculations for the calculation of window properties.
It also contains extensive databases of manufactures of the different components for faster and easier input of a window system, and also allows the user to insert new entries.
WIS has some unique features, such as shading and ventilation input, that allows performing calculations of advanced window systems in a simple manner

As an example of the possible calculations with WIS, we mention:

Thermal Properties

- The U-value of multi-glazing systems with user-defined types of pane, gasses, foils, cavity widths.
- The U-value of multi-glazing systems with films or other layers that are permeable for thermal radiation.
- The U-value of a window with shutters or blinds and the effect of thermally driven or forced air circulation.

Solar and Visual Properties of a Window

- The solar energy transmittance, light and UV transmittance and colour-rendering index of multi-glazing systems with or without solar shading devices, for various angles of incidence of the sun.
- Shows, for a window with scattering or 'redirecting' panes or blinds, which part of the solar radiation passes through without change in direction and which part is scattered or redirected.

For more information, support, and free download of the tool:

www.windat.org

Annex: Persons/organisations responsible for translation and national distribution

WinDat

List of national contact persons for translation of press release & national dissemination

version: April 27, 2004 (Dick van Dijk)
Send comments to: H.vanDijk@bouw.tno.nl

		first name	surname	organisation	email	proposed national contact for:	incl. translation?	confirmed?
1	6	Dick	Van Dijk	TNO		**The Netherlands**	**Dutch**	**YES**
1	5	Richard	Versluis	TNO		-	-	-
1	7	Henk	Oversloot	TNO		-	-	-
1	42	Peter	van Nijnatten	TNO - TPD Eindhoven		-	-	-
2	22	Afroditi	Synnefa	University of Athens (NKUA)		**Greece**	**Greek**	**YES**
3	14	Svend	Svendsen	Technical University of Denmark		**Denmark**	**Danish**	**YES**
3	11	Jean	Rosenfeld	DTU		-		
4	43	Werner	Platzer	Fraunhofer-Institut f. Solare Energiesysteme				
5	21	Thomas	Frank	EMPA		**Switzerland**	**No (via D, Fr, It)**	**YES**
6	41	Patxi	Hernandez	UCD, Energy Research Group		**Ireland**	**Portuguese, Norwegian**	**YES**
7	32	Michael	Hutchins	Brookes Univ.		**UK**	**not applicable**	
8	12	Jean	Roucour	Glaverbel		-	-	-
9	19	Nils-Peter	Harder	Saint-Gobain Glass Deutschland		-	-	-
10	38	Helen Rose	Wilson	Interpane E&B, c/o Fraunhofer ISE		-	-	-
11	30	Karsten	Duer	Velux		-	-	-
12	23	Henk	De Bleecker	Permasteelisa		-	-	-
13	26	Nico	Dekker	Hunter Douglas Contracts Division		-	-	-
14	8	Evert	Bos	Verosol Fabrics bv		-	-	-

14	35	Robert	Kuipers	Verosol		-	-	-
15	10	Gilles	Flamant	BBRI		**Belgium**	**No (via NL, Fr)**	**YES**
16	9	Dick	Dolmans	Hunter Douglas Contracts Division		-		
17	34	Niels-Ulrik	Kofoed	Esbensen Consulting Engineers		-		
18	16	Lars	Olsen	Danish Technological Institute		-		
19	3	Erwin	Lindauer	Fraunhofer-Institut f. Bauphysik		**Germany**	**German**	**YES**
20	36	José L.	Molina	AICIA (Sevilla)		**Spain**	**Castilian (and other Spanish lang.?)**	**YES, with Cadiz**
21	17	Ismael	Rodriguez	University of Cadiz		**Spain**	**Castilian (and other Spanish lang.?)**	**YES, with AICIA**
22	13	Olivier	Renon	CSTB		**France**	**French**	**YES**
22	20	Bruno	Chevalier	CSTB Grenoble		-	-	-
23	abs?	Richard	Mitanchey	ENTPE		-	-	-
24	25	Michele	Zinzi	ENEA		**Italy**	**Italian**	**YES**
25	2	Franco	Geotti-Bianchini	Stazione Sperimentale del Vetro (SSW)		-	-	-
26	24	Paola	Iacomussi	IEN Galileo Ferraris		-	-	-
27	29	Giovanni	Di Leo	InArch		-	-	-
28	31	Ismo	Heimonen	VTT		**Finland**	**Finnish**	**YES**
29	33	Bertil	Jonsson	SP Swedish National Testing and Research Institute		**Sweden**	**Swedish**	
30	39	Arne	Roos	Uppsala University, Angstrom Laboratory		-	-	-
31	4	David	Kelly	Building Research Establishment (BRE)		-	-	-
32	40	Iain	Mac Donald	University of Strathclyde		-	-	-
33	15	Ray	Williams	National Physical Laboratory		-	-	-
34	28	Denis	Janssens	Aluminium Center Belgium		-	-	-
35	abs.	Paolo	Rigone	UNCSAAL		-	-	-
EP1	abs.	Jaap	de Nijs	Guardian Luxguard		-	-	-
EP3	1	Robert	Davies	Pilkington Research Lathorn		-	-	-
EC1		Mike	Rubin	LBNL		-	-	-

Checklist of EU countries and languages

		EU countries:	translation to language covered?	country covered for distribution?	
1		Austria	yes via D	yes, via ERG (IRL)	
2		Belgium	yes via NL, Fr	yes	
3		Cyprus			
4		Czech Republic	no	no	**The new EU countries:** ERG (IRL) is preparing a distribution plan with the help of the Enerbuild Network, though can not be sure at the moment that translations of the press releases for all the countries (8 different languages!) will be possible within the budget
5		Denmark	yes	yes	
6		Estonia	no	no	
7		Finland	yes	yes	
8		France	yes	yes	
9		Germany	yes	yes	
10		Greece	yes	yes	
11		Hungary	no	no	
12		Ireland	not applicable	yes	
13		Italy	yes	yes	
14		Latvia	no	no	
15		Lithuania	no	no	
16		Luxemburg			
17		Malta			
18		Netherlands	yes	yes	
19		Norway	via ERG (IRL)	yes, via ERG (IRL)	
20		Poland	no	no	
21		Portugal	via ERG (IRL)	yes, via ERG (IRL)	
22		Slovakia	no	no	

23		Slovenia	no	no
24		Spain	yes	yes
25		Sweden	yes	yes
26		Switzerland	yes via D, Fr, It	yes
27		United Kingdom	not applicable	yes