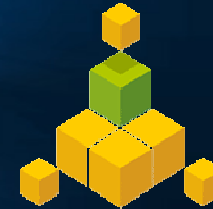




TRNSYS

a **TRaNsient SYstem Simulation** tool

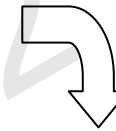


What is TRNSYS?

- Program solving algebraic/differential equations

Modular approach

- 1 Complex problem = Σ small problems
- General formulation (any problem!)
- Library of common “**energy system**” components
 - Models dedicated to **building simulation**
 - Method to add user-written components
- Suite of “utility” programs
 - **visual interfaces**
 - Create distributable applications
 - Input data more easily and faster
 - Create our own models easily (W language)



- Solar Thermal Processes
- Ground Coupled Heat Transfer
- High Temperature Solar Applications
- Geothermal Heat Pump Systems
- Coupled Multizone Thermal/Airflow Modeling
- Optimization
- Energy System Research
- Emerging Technology Assessment
- Power Plants (Biomass, Cogeneration)
- Hydrogen Fuel Cell Systems
- Wind and Photovoltaic Systems
- Data and Simulation Calibration

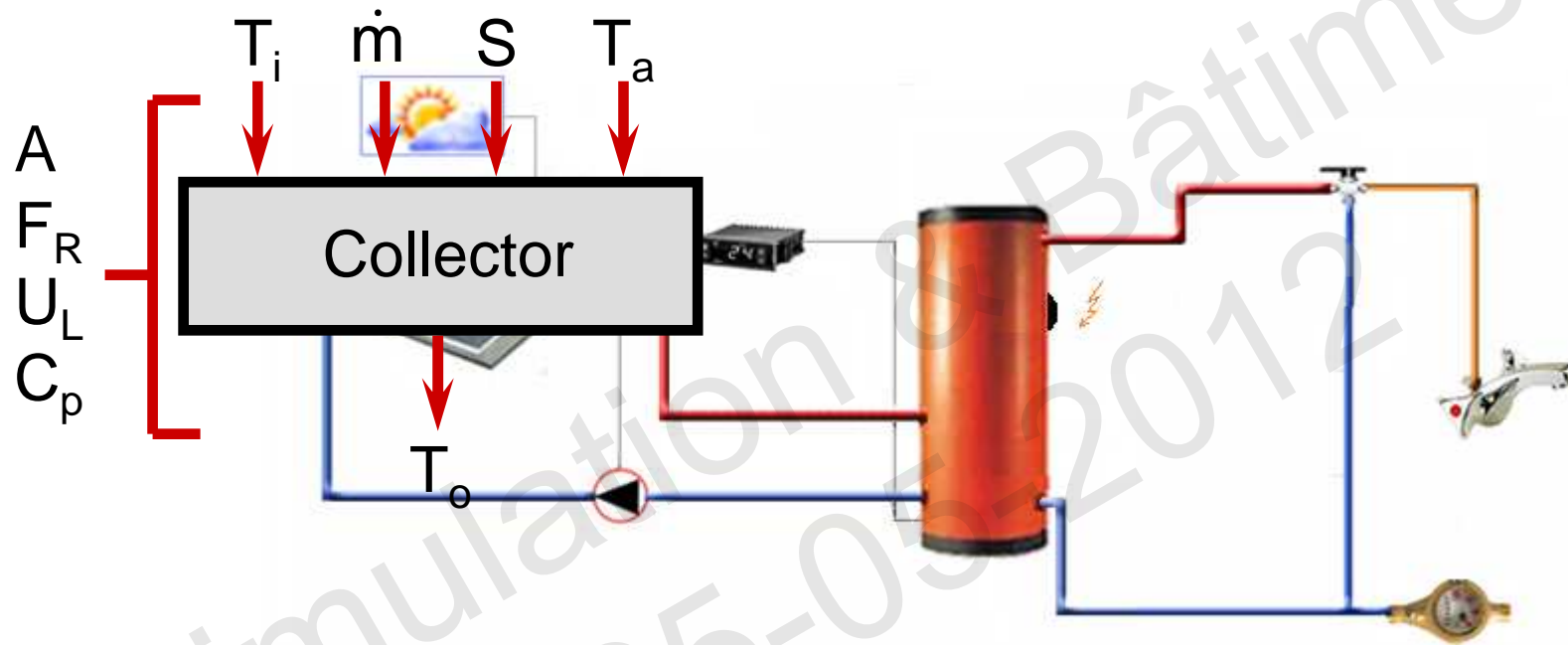
TRNSYS Concept: Component

- One system = a set of components

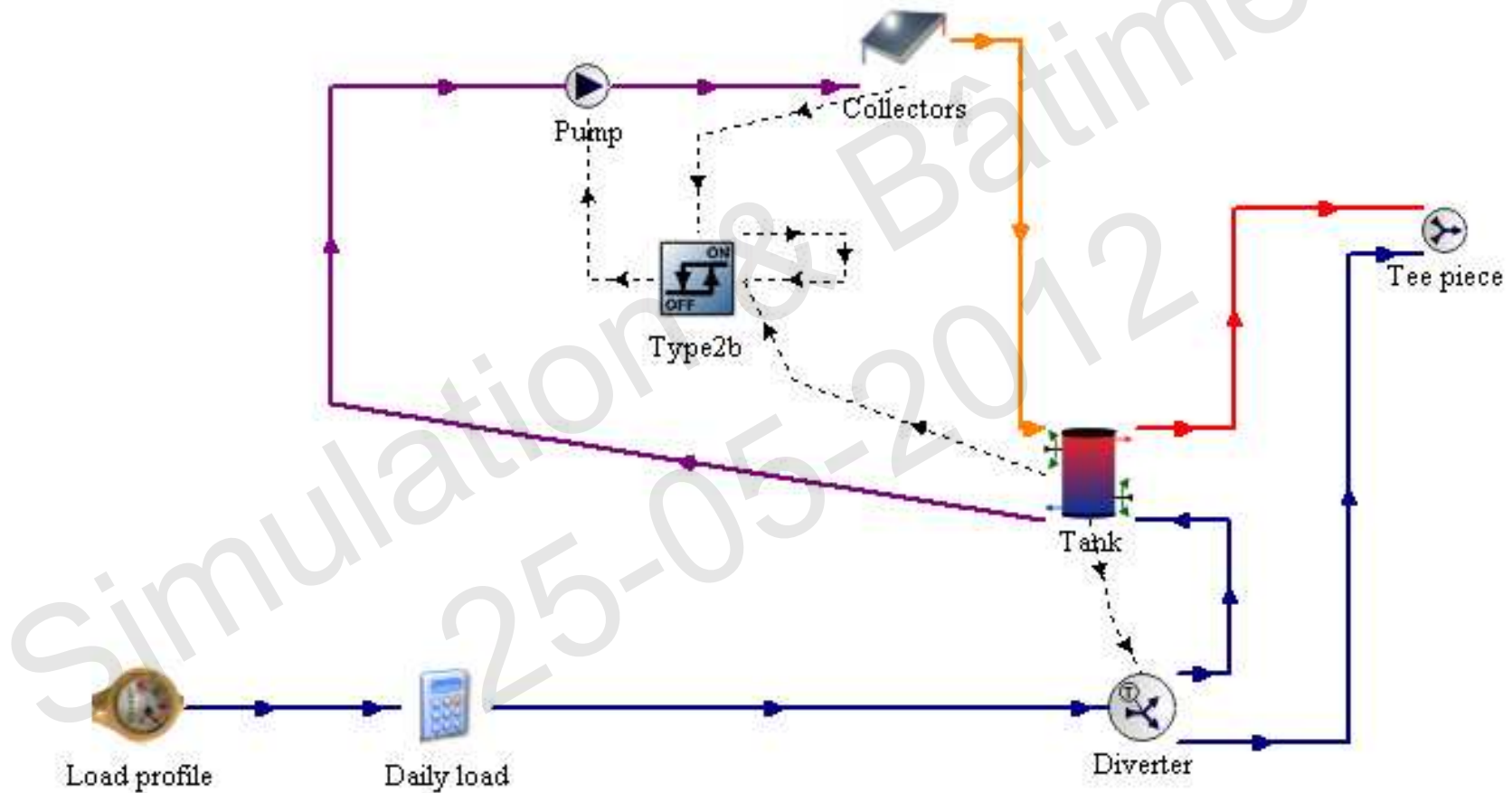
↪ **Type**

- One **component** is associated to one process
 - **Components are connected** to accomplish a specified task
- Component mathematical model
 - Inputs + Parameters → Outputs
 - “Black box” approach... But you can open it!
- **Simulating system performance** by simulating the performance of individual components

Example: SDHW system



TRNSYS Simulation Studio



Building model : TYPE 56

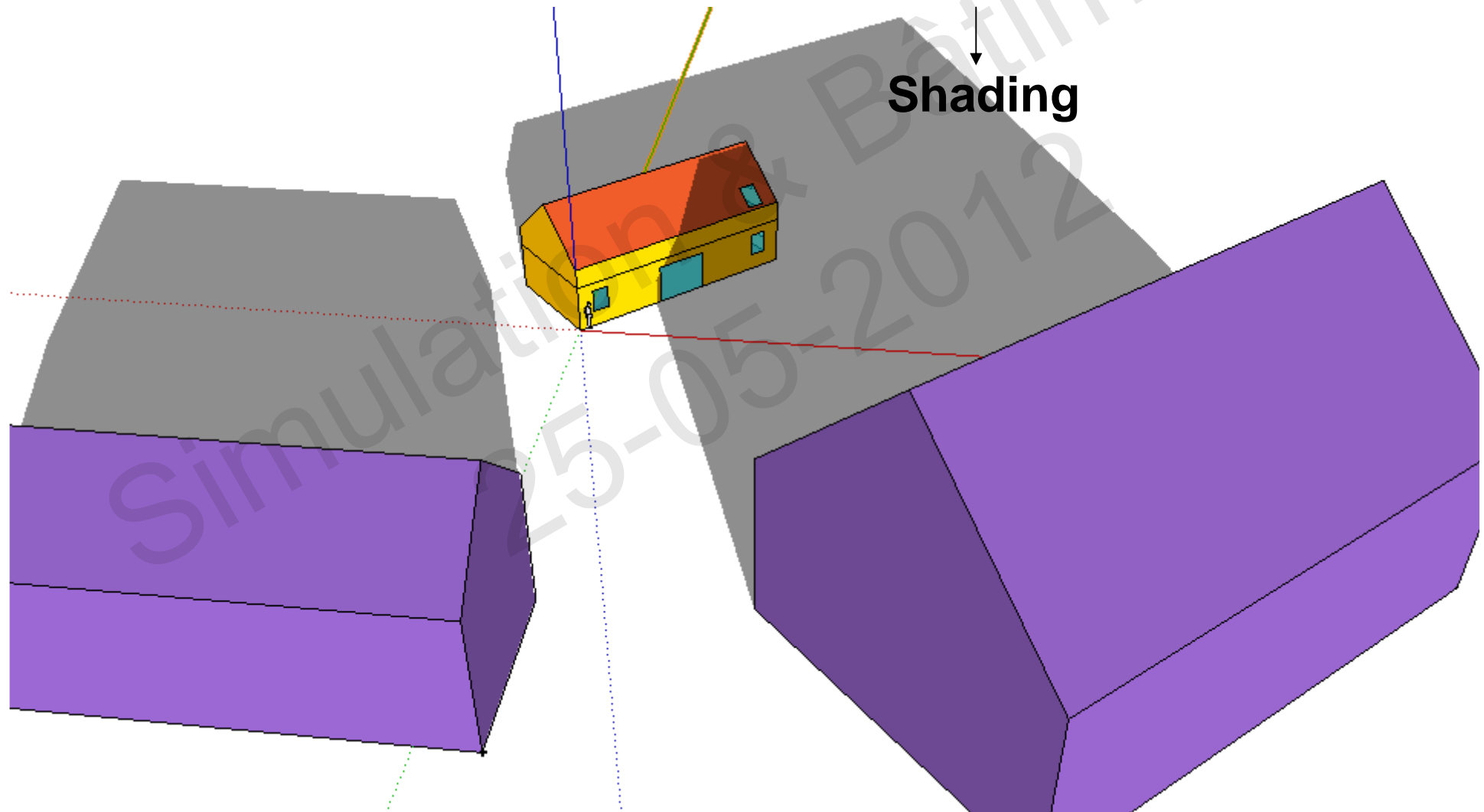
(User interface → TRNBUILD)

Building is split into thermal zones

- Energy Balance Model
 - Convective and radiative heat flows in the zones
- Geometrically based (for radiation calculations)
- One air node per zone (but virtual air node for stratification computation)
- Transfer Function used for heat flow through walls
- Comfort evaluation (PMV & PPD)
- Connection with HVAC system
- Humidity Model
- Internal and external shading computation
- Air flow calculation using TRNFLOW add-on

TRNSYS3D - a plugin for Google SketchUp™

Geometry defined in SketchUp, imported into TRNSYS
→ Geometrical model for inside and/or outside radiation



TRNSYS new version 17.1



Main improvements :

- Building Wizard : now for 3D building too
- Type 56 integrates radiation control of shading devices
- New TRNSYS3d V 1.0.7
 - New construction types can be defined (before, limited number of types)
 - Definition of new boundary temperatures
 - Shading control for windows
 - Some corrected bugs!
- New plug-in : visualization of Shading and insulation matrix

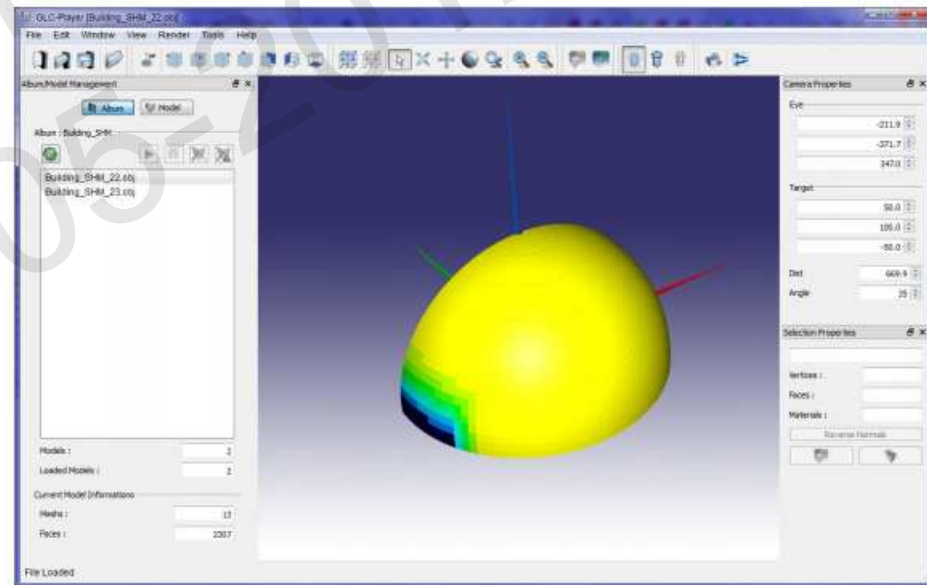


Figure 1.6.2-1: GLC player with visualized SHM information for window 22

→ 60 TRNSYS customers mainly in Belgium

Universities, Research centers, Engineering company, Architects

3E	Gent University/Architecture and urban planning	Scheldebouw - Permasteelisa Group
Abetec nv	HELHa	SGI
Adviesburo Nieman	ICEDD	T4M
APERe	IKP bvba	TEI of Piraeus
Aquation s.a.	Ingenium	Terra-Energy
Arcadis	Jaga NV	TGI s.a.
Arcelor Mittal	KAHOSL	TNO
BSolutions	Karel de Grote - Hogeschool vzw	T-palm
Bureau Gosset	Katholieke Hogeschool Kempen	TPF Engineering s.a.
Cenaero	Katholieke Universiteit te Leuven	UCL/Architecture&Climat
CRTE	KUL/Bouwphysica	ULg - LEMA
CSTC/WTCB	KUL/Toegepaste Mechanica	Umons - Thermique et Combustion
Daikin	Marcq & Roba	Università degli Studi di Roma Tre
De Nayer Instituut	Matriciel	Université d'Abomey-Calavi
DTC	Neo-construct	Université de Luxembourg
Ecorce	NewTech	Université Mohammed Premier
Energie et Environnement S.A.	OCHSNER	University of Ulster
ENETEC	Poly-Tech Engineering	VITO
ERM	PROgéna	VK Engineering
Georges&Theis	Provinciale Hogeschool Limburg	Xi'an Jiaotong University



More information :

<http://trnsys.com/> → free demo version

Developers websites :

<http://sel.me.wisc.edu/trnsys/>

<http://www.cstb.fr/>

<http://www.transsolar.com/>

<http://www.tess-inc.com/>

Distributor for BENELUX : ULg / **B**uilding **E**nergy **M**onitoring and **S**imulation

<http://www.bems.ulg.ac.be>

Licences : shennaut@ulg.ac.be

Trainings : fclaud@ulg.ac.be

Help desk : sebastien.thomas@ulg.ac.be

TRNSYS training
September 5th-7th
Arlon