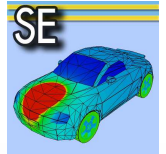# OKTAL-SE
Synthetic Environment

EO ✓
AEO ✓
RF ✗
GNSS ✗

RAY ✓

SE

SE-THERMAL

THERMAL MODELLING TOOL

FAST ✓

SE-THERMAL toolkit is a set of tools dedicated to the calculation of all the possible temperature states of a scene at a given time of the day for given atmospheric conditions. The tools take into account the history of thermal and atmospheric conditions for shadow-effects computation and associate temperature with a virtual 3D scene.

Features

- **Temperature calculation of polygons of a 3D terrain**

- **Takes into account 3D masking involved by the 3D terrain**

- **Function of atmospheric conditions**

- **Open to external temperature computation code as TAITHERM™ dedicated to 3D objects**

- **Used to make generic thermal computations**

- **A Validation Dossier is delivered with the software in order to assess the quality of the code.**

Dependence

The physical realism that can be achieved with the SE-THERMAL toolkit mainly depends on the quality of the input data, which are:
1. The environment data (atmospheric files)
2. The thermal description of the materials
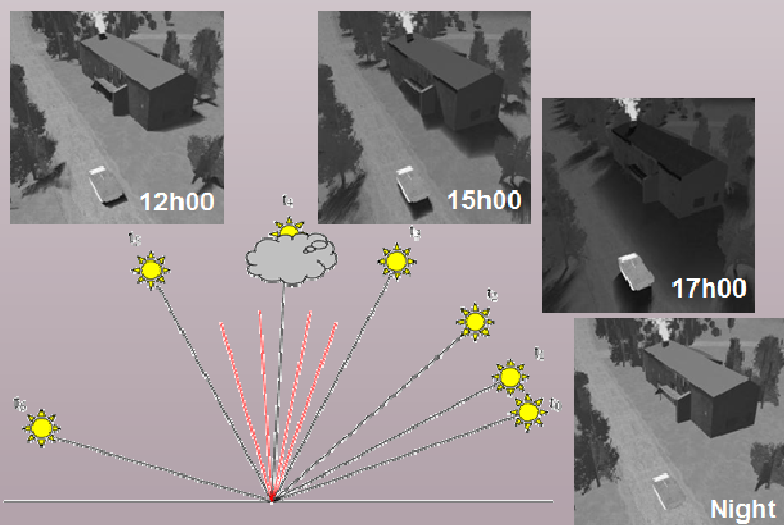
Polygons Temperature Calculation

The database is considered to be previously characterized with physical data and is used in correlation with an atmospheric conditions file.

3D Masking

Realistic computation of incident atmospheric fluxes, taking into account masking within the 3D database.

Past weather forecast taken into account

The history of thermal and atmospheric background, and specifically the shading effects of one object on another (or on the ground) are taken into account in the computation.

12h00   15h00   17h00   Night

Options

- **The thermal shadow resolution can be enhanced. The thermal shadows are computed by SE-RAY-IR directly and licensed through SE-THERMAL-SHADOW option**

Benefits

- **Well adapted for 3D terrain temperature calculation**

- **High Efficiency: Allows managing large database in reasonable computation time.**

$T_{air}^{fs}(t)$

sky

h_{fs}

z

0   z_N

$\varphi_{abs}^{fs}(t)$

$\varphi_{em}^{fs}(t)$

front side   *backside*
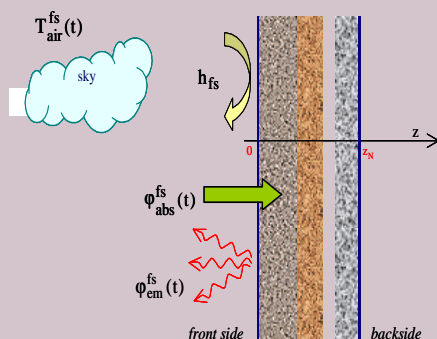
System requirements

![Windows logo] **Windows 7 and XP**

![Linux logo] **Linux system**

Type of polygons

Deals with « isolated polygons » and « warmed polygons » (for which an inner temperature is user defined).

Inner heat sources

Computed with user defined heat flux.

Influence of wind

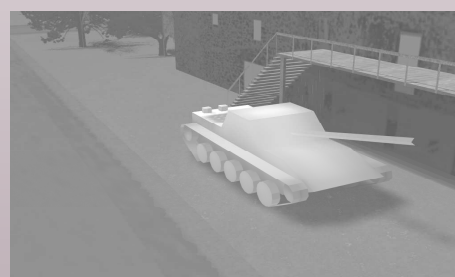The wind and its direction is taken into account.

Physical phenomenon

Diffuse terrain reflection is taken into account in the flux computation of non-horizontal polygons. Diffuse sky and terrain irradiance are depending on the altitude.

SE-TH-MTC

Computes the temperature of each material of the physical material database as function of given atmospheric conditions.
Used to prepare SE-RAY-IR computation and SE-FAST-IR rendering.