Computer Models
For
Fire and Smoke

Model Name:	TTAM – Transient Tenability Analysis Model
Version:	1.3
Date:	February 2014
Model Actively Supported?:	Yes.
Classification:	Tenability, Zone, Egress Model
Very Short Description:	Transient Tenability Analysis Model determines the potential number of occupants affected by fire and smoke within a building. The software combines the egress calculations within TSEA with the smoke behaviour within TSAM. Tenability is calculated for: Evacuation through low visibility smoke, Dose related incapacitation from CO exposure, Incapacitation from inhalation of hot smoke; and, Incapacitation through thermal radiation from a smoke layer. The software modifies egress walking speed and egress behaviour as a function of smoke location and temperature.
Modeler(s), Organization(s):	Matthew Salisbury BEng CEng MIFireE MSFPE, SFES
User's Guide:	A user guide is provided as part of the installation, accessed from the Help menu in the software.
Technical References:	SPFE Exit Flow Rates, SPFE Tenability (CO), PD 7974.3.
Validation References:	There are no independent validation reports available.
Availability:	www.fire-engineering-software.com
Price:	Freeware
Necessary Hardware:	Windows

Computer Language: Visual Studio

Size: 5.5MB

Contact Information: support@fire-engineering-software.com

Detailed Description:

The software is designed to provide a broad understanding of tenability in a building accounting for key issues such as population, fire size and ventilation characteristics. The approach is designed to provide a general overview of conditions within a space based on a pre-defined fire scenario. Many different scenarios can be assessed allowing comparison of various design options.

The program is intended to bridge the gap between current simplistic or one-step analysis techniques and more detailed models. The rapid assessment times provide tenability analysis within the Quantified Risk Assessment software BuildingQRA.

This software is based primarily on network flows of mass and energy from one space to another to calculate smoke movement. A number of plume models are available to determine entrainment from one space to another. Occupant walking speed and local densities at exits controls egress flow rate.

The approach simplifies many aspects of complex smoke & egress modeling, such as there is no pressure solver used within the analysis, however this allows relatively quick assessments of traditionally complex problems.

The initial prescribed conditions are:

1. The area of a space termed a floor(defined by a polygon with a set height);
2. The number of occupants in the space. This is either directly entered or calculated by an occupant density.
3. Occupants may have a pre-movement time which can also be used to assess a phased egress strategy. The pre-movement time may also be defined by a distribution.
4. Occupant walking speed is defined, which can also be set by a distribution.
5. Exits are defined by their width and exittype, i.e. a stair, a corridor or a doorway. Floors may have any number or type of exits.
6. Smoke modelling is based on BS 7974 Part 3.
7. Tenability is calculated for each person accounting for the visibility of smoke the person is exposed to, their Fractional Effective Dose (FED) of Carbon Monoxide, smoke temperature at head height and thermal radiation.

The results of the assessment are shown graphically in a 3D model, tabulated per zone and can be graphed. Results may also be exported to a text file.