

# B-RISK update

Check out the latest news on B-RISK, an invaluable BRANZ tool for fire safety engineers.

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**FIRE SAFETY** engineering describes a process to design fire-safe buildings. Design features and safety systems included in a building work together to make a building safe. The longer the distance a person needs to walk to reach a fire exit, for example, the longer they will potentially be subjected to smoke and heat from a fire.

### **Calculating evacuation time**

In a performance-based design, the time to evacuate will be calculated and compared to calculations of the fire growth and spread. The engineer must demonstrate that occupants have enough time to escape from the building before the heat and smoke conditions become life-threatening.

Developed by BRANZ, B-RISK is a fire design and analysis software application. Fire engineers can use it to predict fire and smoke spread in buildings and to determine how quickly the occupants must be able to leave so they stay safe. B-RISK is used by most New Zealand fire safety engineers for fire safety analysis.

### **Used to achieve Code compliance**

To meet the protection from fire objectives of the Building Code, it must be shown that occupants of a building can safely escape during a fire. Buildings also need to allow relatively safe fire-fighting and rescue operations and ensure the fire won't unduly affect neighbouring property and impact the environment.

Simple buildings can be designed using the Acceptable Solutions, but for more complex buildings, a fire engineer may need to carry out a performance-based design. This can be done in accordance with the Building Code Verification Method C/VM2, or as an Alternative Solution.

The Verification Method stipulates various design fire scenarios that must be checked, along with what assumptions and calculation inputs to use. The engineer is required to anticipate where fires might occur in the building and then determine what the likely impact would be on the safety of occupants.

### **B-RISK reduces potential for errors**

The B-RISK software has been provided with an optional operating mode, assisting users to select inputs consistent with the requirements of C/VM2. This saves time for the user and reduces the potential for user error when choosing the appropriate inputs.

Calculations of visibility through smoke, carbon monoxide concentrations and smoke temperatures are made by B-RISK, taking the size of the design fire, building geometry and ventilation conditions into account. For example, Figure 1 shows the temperature of the hot gases in a smoke layer in different rooms in a building and how it changes over time.

### **3D graphics display smoke spread**

B-RISK uses clever 3D-graphics software called Smokeview developed by the National Institute of Standards and Technology in

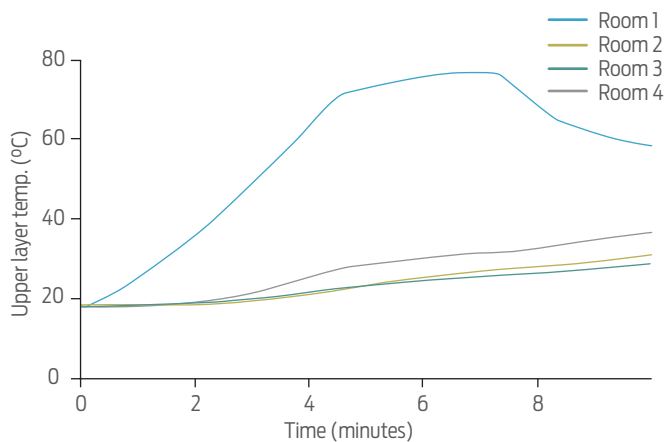


Figure 1: Temperature over time of the hot gases in a smoke layer in different rooms in the building.

the US to display the building geometry and the extent of smoke spread in the building. An example is shown in Figure 2 where the temperature and the depth of a smoke layer underneath a ceiling are indicated using colour. Separate calculations are done by the engineer of the occupants' response and travel to an exit to ensure safe escape from the building is achievable.

### BRANZ offers training and support

BRANZ has a long-standing arrangement with the University of Canterbury, which offers a postgraduate qualification in fire engineering, to provide training to students on the use of B-RISK.

Additionally, BRANZ staff have delivered training workshops in conjunction with the Society of Fire Protection Engineers to the industry and provide telephone and email support to B-RISK end users. These interactions with academia, industry and users are valuable in identifying useful future improvements and new features. They also assist in identifying the underlying research needs that will help ensure performance-based fire designs are both appropriate and robust.

### Useful resources available

An updated *B-RISK 2016 user guide and technical manual*, BRANZ Study Report 364, is available from [www.branz.co.nz](http://www.branz.co.nz) under the Toolbox along with the current version of the B-RISK software.

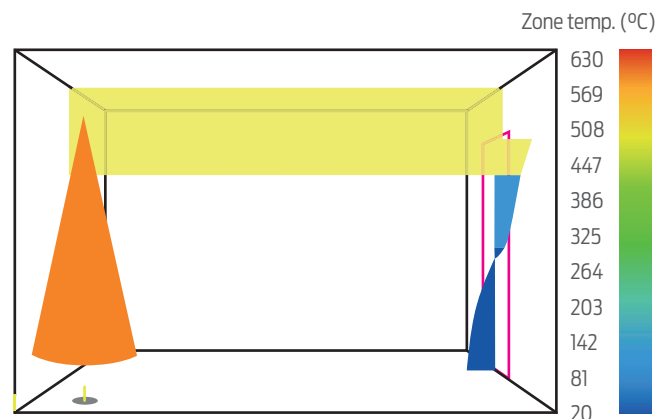


Figure 2: Smokeview uses colour to show the temperature and depth of a smoke layer underneath a ceiling.

In a new development, the *Getting started with B-RISK* YouTube video tutorial intended for new users of the software is now also available at [www.youtube.com/watch?v=yJUbJanFi2U](http://www.youtube.com/watch?v=yJUbJanFi2U).

### New BRANZ research to further extend B-RISK

An improved method of calculating the temperatures and thermal impact of a fire on a building's structure is being developed as part of the research project *Limiting fire spread by design*. This will be included in B-RISK and will allow engineers to specify an appropriate fire resistance rating (FRR) to ensure that the building design will satisfy the fire engineering performance objectives.

Future research is also planned as part of another Building Research Levy-funded project, *Preparing the foundation for risk-informed fire safety design*. It is proposed to eventually link B-RISK calculations of the fire and smoke spread to other calculations for how quickly the occupants can escape.

A risk-informed approach would require that the probability of fire be considered as well as its impact on the building or occupants. The statistical uncertainty in the calculation inputs should also be accounted for, allowing the level of safety to be determined with greater confidence and making the design more robust and resilient. ◀

**For more** ▶ Contact Colleen Wade at [colleen.wade@branz.co.nz](mailto:colleen.wade@branz.co.nz) for further information on B-RISK.