



## STRUCTURAL FIRE ENGINEERING

Structural fire engineering is the engineering discipline relating to the analysis and design of structures under exposure to fire. Holmes Fire has a long track record in performance based structural fire engineering analyses for timber and steel framed structures in New Zealand, Australia and the US. We have also undertaken performance based analyses to assess the robustness of buildings under fire conditions. Such analyses have been used to provide alternative structural fire designs which have resulted in cost savings in passive fire protection and improved aesthetics.

Holmes Fire employs a range of analysis methods, including advanced non-linear finite element analysis, to undertake the structural fire analysis. With advanced finite element analysis, the response of structures in fire can be analysed, taking account of phenomena such as large displacements, thermal expansion and contraction, and material changes at elevated temperatures. This method has been used to demonstrate the reduction in structural fire protection, which may not have been possible with simpler methods.

Holmes Fire has a specialist team of structural fire engineers with the technical expertise and more than ten years of experience in the field of structural fire engineering, capable of analysing the response of steel, concrete and timber structures in fire conditions.

The resulting design with structural fire engineering has provided the following benefits:

- Reduction of passive fire protection in new and existing steel framed structures
- Increased property protection
- Improved aesthetics by having exposed steel or timber structures
- Structural robustness under exposure to high challenge fires
- Reduction in long term maintenance costs
- Improved flexibility for the use of the structure

Recent project examples:

- Auckland Museum Grand Atrium - completely unprotected structural steel in the main atrium.
- 21 Queen Street, Auckland - all but major floor beams were unprotected for this office building.
- Appartamento Il Casino, Wellington - most of the structural steel elements did not require passive fire protection.
- Stamford Plaza, Auckland - high-rise apartment building; structural steel was completely unprotected.
- Williamsburg Bank Building, Brooklyn, NY – unprotected steel beams in the Tower Dome

