

## Capability Statement (Infrastructure & Buildings)

### Services

ABES provides design and sub-consulting services in Australia and internationally. We are able to provide our services in a wide range of applications in the fields of general structural engineering, bridge engineering and building design.

ABES engineers have extensive experience in the application of high-end analysis software. We have a solid track record in solving complicated analysis problems and we are capable of turning analysis results into practical design solutions.

ABES own licences of powerful software tools including SOFiSTiK. We have also developed a variety of in-house products to assist with our consulting work. We also have a team of software engineers at our disposal to help with the coding of project-specific software solutions where appropriate.

### Clients

ABES assists clients active as design consultants in the fields of building engineering, bridge engineering or general structural engineering. Our specific expertise in various highly specialised areas allows us to provide efficient and practical solutions for specific challenges within short time frames. We have the expertise to assist with complex, intricate, unusual, and time critical problems.

ABES work for government organisations as main consultants for the design of infrastructures and buildings. We also perform independent checks, give expert advice and provide specialist consulting services.

### Areas of Expertise

ABES areas of expertise include, but are not limited to, the following topics:

- Bridge, building and general structural design according to a variety of design codes including Australian Standards.
- Consideration of non-linear and time-dependent material properties including steel yielding, concrete cracking, creep and shrinkage or various soil material models.
- Stability analysis, P-Delta effects and buckling analysis of steel structures.
- Modelling of complex geometries with a variety of element types including for example: form finding for cable-supported structures or membrane structures, determination of bridge pre-cambers or geometry control for pre-cast segmental bridges.
- Construction sequence simulations for all construction techniques used in building and bridge engineering.
- Structural dynamics for building and bridge applications including earthquake analysis and design, footfall analysis, wind dynamics, vehicle structure interaction.
- CFD analysis for simulation of wind flow interacting with structures.

### Working with ABES

ABES are flexible and willing to cooperate in various ways with our clients depending on what works best in a given situation. We are prepared to lead and manage project teams; or we can work as part of an established team on a large project and support

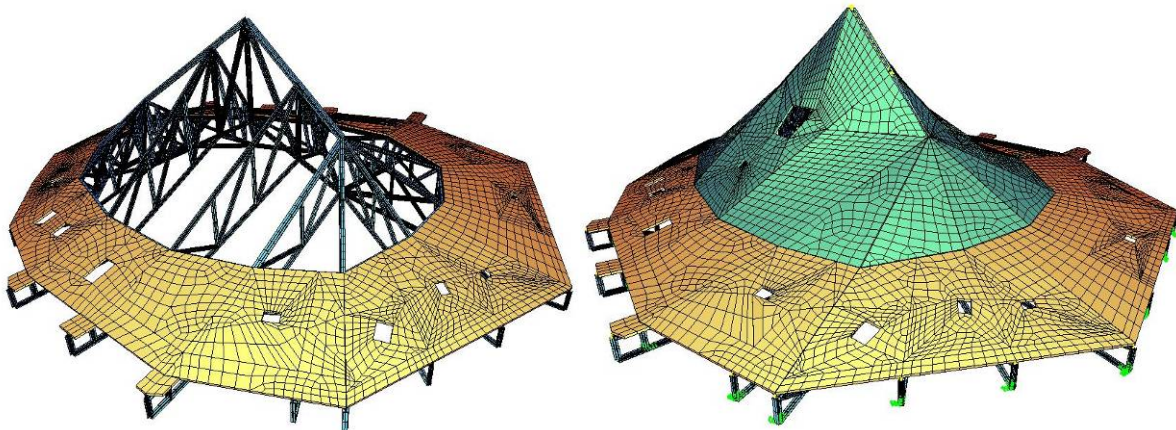
other members of this team with their analysis or modelling tasks. Or we can solve specific isolated tasks and return a report and a model if desired.

ABES directors Andrew Wheeler and Martin Pircher both hold PhD degrees in structural engineering and both have long histories of computational mechanics. They have both worked as structural engineers as well as software developers. All work for clients in Australia and New Zealand will be closely supervised or performed personally by either Martin or Andrew in line with our ISO 9001 quality assurance policy.

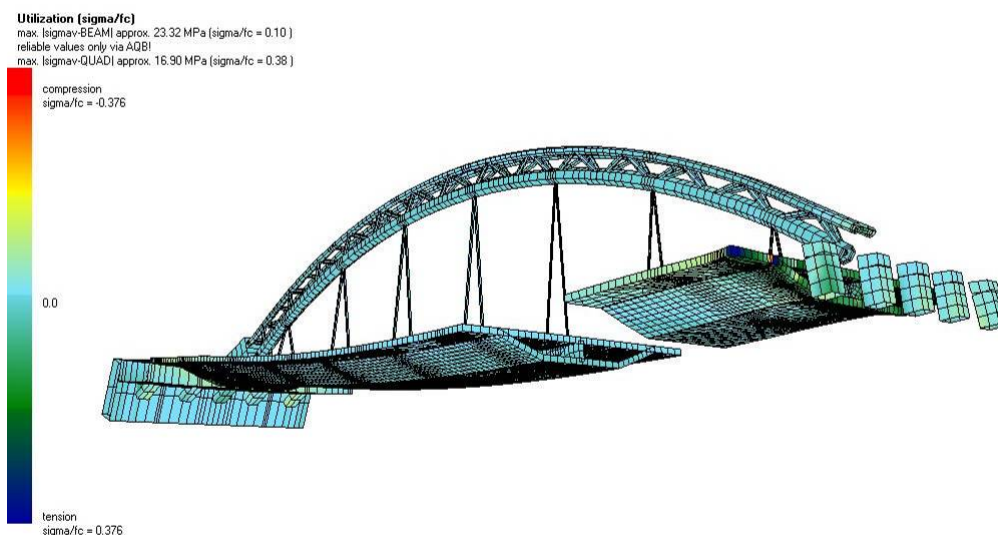
## Typical ABES Projects

- **Link Bridge**, reticulation analysis. ABES Australia were engaged by the engineers on the project to establish the level of loading on the cable stay bridge and study the effect of changing the reticulation of the fixed bearing on the bridge.
- **Westgate Bridge Widening**, project support. The engineers of the project alliance received support with various modelling tasks throughout the project execution. Additionally, certain specific tasks were executed by ABES including a non-linear analysis of the bridge piers, a CFD analysis of the deck cross-section in order to verify wind loading and implementation of a bridge-specific traffic loading model.
- **Island City Bridge**, design support. For the design of this 70m arch bridge ABES provided ongoing modelling support, general structural engineering advice and internal review services.
- **Traffic Sign Gantry**, wind dynamics. Advanced CFD analysis and general advice on wind dynamics was provided to find a solution for wind-excited traffic sign gantries.
- **Hunter Expressway**, geometry control support. Software and project support was provided for the geometry control of six pre-cast segmental cantilevered bridges.
- **Hamburg Concert Hall**, project support. For this three-dimensional concrete shell structure supported by steel trusses spanning 60m across a concert hall a non-linear analysis was performed in order to determine the deflection under cracked concrete conditions.
- **Inflatable Ice hockey Stadium** - A temporary stadium for ice hockey competitions in Estonia, consisted of a membrane contained in a steel cable mesh. The membrane was filled with pressurised air, thus lifting the membrane into its final dome shape. ABES were involved in the creation of a three-dimensional Finite Elements model of the structure including the detailed construction sequence and the shape finding for the membrane and the steel mesh. This model was then used for shape control of the structure throughout construction, stress checks for various stages during erection and the analysis off the structure under wind loading.
- **Structural Steel Racking Systems** - Large automated racking systems are manufactured and delivered to customers world-wide by KNAPP of Austria. ABES have been providing structural engineering expertise, earthquake engineering, design checks and on-site support for Knapp since 2006. Projects in Chile, the USA, and numerous European locations.
- **Subansiri Bridge**, structural dynamics. An investigation into the dynamic properties of this suspension bridge with a main span of 300m was performed.
- **Saigon East-West Highway interchange**, pre-camber calculation. A two-dimensional pre-camber for this 8-span post-tensioned bridge with a total length of 270m and a variable width of up to 35m was determined.
- **Hyde Park Temporary Structure**. Analysis and design of a stressed steel structure. Analysis included stressing sequence to construct the structure and design checks on the structure under serviceability and ultimate limit state conditions.

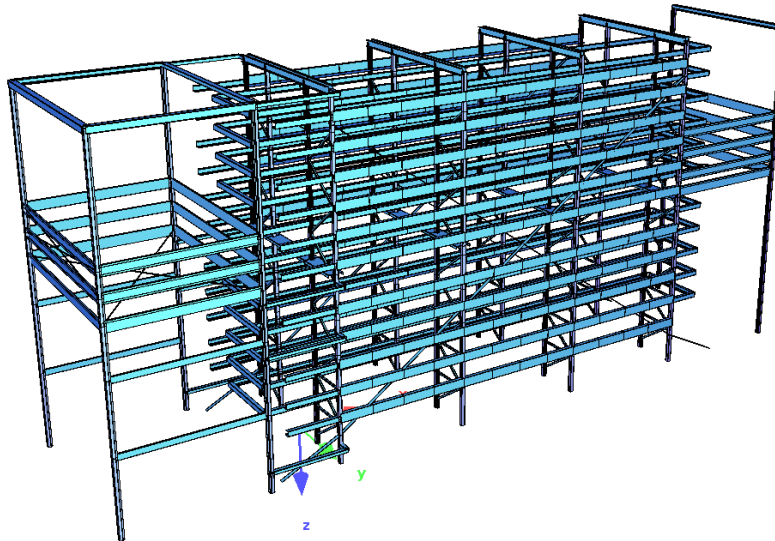
- **Product Certification.** Certification of various products for compliance with Australian Standards. Products include structural steel decking, structural formwork, wall systems.
- **Modular Noise Barriers for High-Speed Railway Lines.** Provision of engineering expertise, evaluation of loading conditions exerted by passing trains, design optimisation and design checks for a novel noise barrier suitable for high-speed railway lines.



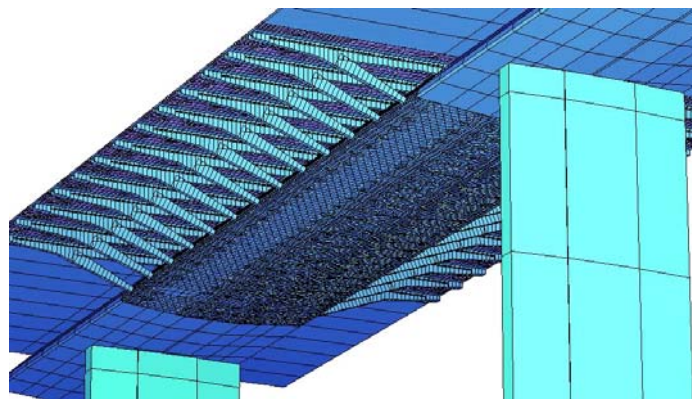
Model of Concert Hall in Hamburg (Elbphilharmonie).  
Model by ABES, consultant: WGG Schnetzer Puskas Ingenieure AG of Basel, Switzerland.



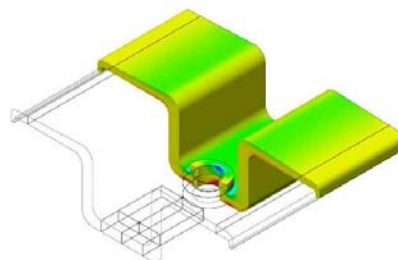
Model of the Island City Bridge.  
Model supported by ABES, consultant: Arun Chaiseri, Bangkok, Thailand.



Model of Steel Racking System.  
*Consultant: ABES, Austria.*

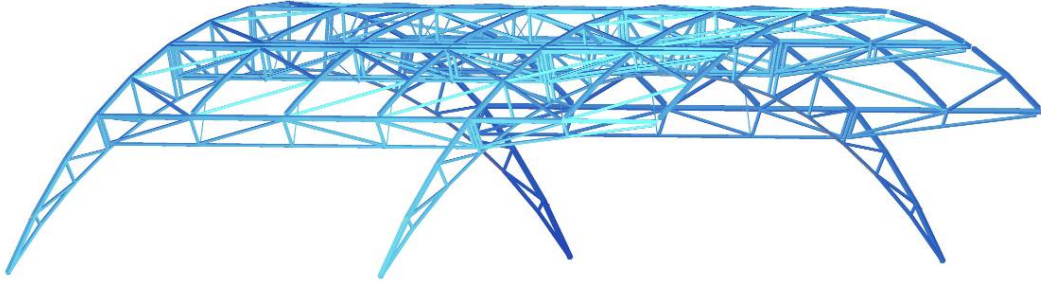


Model of the Westgate Bridge approach viaducts.  
*Model support provided by ABES, consultant SKM, Melbourne.*

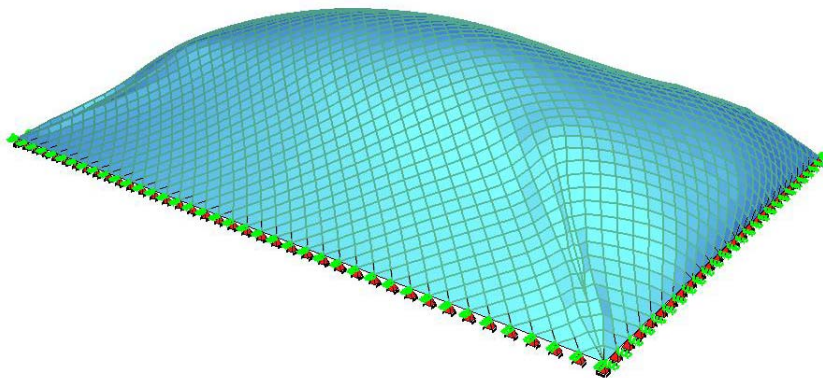


Modular Noise Barriers for High Speed Railways.  
*Product installed and FEA Model of system components.*





Model of Hyde Park Temporary Structure.  
*Model by ABES, Design Checks ABES Australia.*



Model of Inflatable Ice hockey Stadium.  
*Model by ABES, Design Checks ABES Australia Consultant Finmap of Helsinki.*