



ISA Sports City Bahrain

ISMAIL KHONJI ASSOCIATES:

SuperSTRESS/SuperSTEEL

'Without the ease and simplicity of importing such a complex structure into SuperSTRESS, and without the powerful analysis and design tools in SuperSTRESS and SuperSTEEL, it would not have been possible to analyse this structure.'

The Project

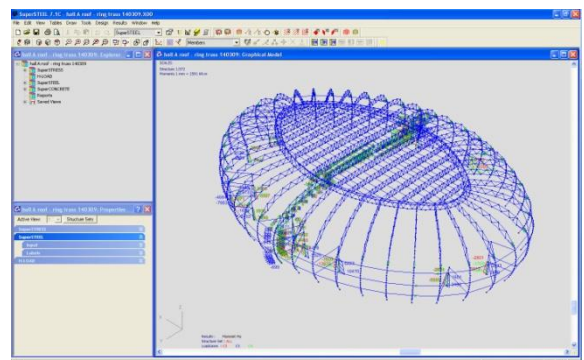
ISA Sports City is a major construction project that aims to harness the Olympic ambitions of the kingdom's sport lovers. While many aspects of the entire BD40 m project are only just commencing, it is the recently completed Hall A, in the shape of a doughnut and featuring a six-lane athletics track circumventing a large open ground that will play host to handball, that has caught the imagination. With mammoth dimensions extending from 132 m x 96 m x 26 m, and with 42 radial trusses comprising over 5000 members, its design is a marvel of modern engineering and a credit to the partnership between Bahrain-based civil engineering company, Ismail Khonji Associates (IKA) (Consultants), and Hong-Kong-based architects, Leigh & Orange.

Ismail Khonji Associates

IKA Consultants is a leading engineering consultancy based in Bahrain and specialising in the design of long span and complex structures. In conjunction with architects, Leigh and Orange, and using Integer's SuperSTRESS and SuperSTEEL software, IKA Consultants was able to simply and accurately analyse this complex design.

A challenging project

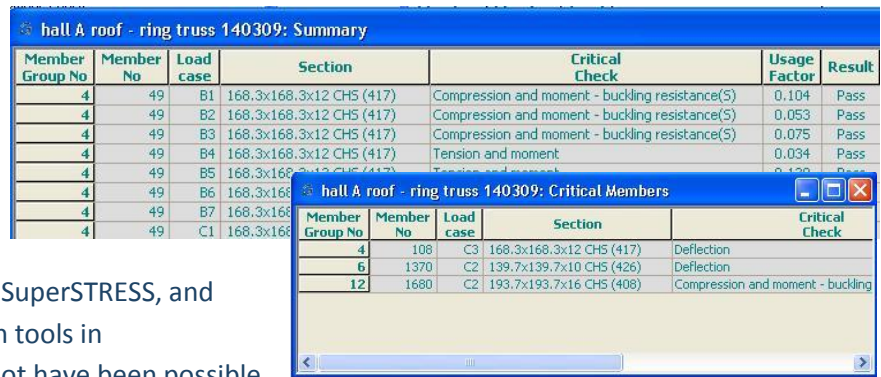
The most challenging aspect of this project was the large, complex structures in both concrete and steel. The stadium's base comprises curved RC columns from which forty-two triangular radial trusses reach up to create the shape of a doughnut. Where you would expect the doughnut's hole, horizontal trusses join to form a fixed roof. With over 5000 members creating a myriad of intricacy, it was the formidable capability of software within SuperSUITE that made the project viable.



Managing Director of IKA, Ismail Khonji, has been using Integer’s SuperSTRESS and SuperSTEEL software for over 23 years. ‘Prior to using this technology, even the simplest trusses took time to analyse,’ he says, ‘but with such technological advances, complex designs can be analysed with ease.’

‘SuperSTEEL enabled us to merge joints and correct the model easily, and the ability to build images using the rendering facility was hugely valuable.’ Ismail continues, ‘Changes are easy to introduce. From the simplicity of importing from a DXD file to the speed of re-running the design after client feedback or the results of our analysis, valuable time was saved. The fact that we could include wind and temperature conditions in combination loading made the analysis much more accurate.’

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The screenshot displays two windows from the SuperSTRESS software. The top window, titled 'hall A roof - ring truss 140309: Summary', shows a table of analysis results for various members. The bottom window, titled 'hall A roof - ring truss 140309: Critical Members', shows a table of critical members and their checks.

Member Group No	Member No	Load case	Section	Critical Check	Usage Factor	Result
4	49	B1	168.3x168.3x12 CH5 (417)	Compression and moment - buckling resistance(5)	0.104	Pass
4	49	B2	168.3x168.3x12 CH5 (417)	Compression and moment - buckling resistance(5)	0.053	Pass
4	49	B3	168.3x168.3x12 CH5 (417)	Compression and moment - buckling resistance(5)	0.075	Pass
4	49	B4	168.3x168.3x12 CH5 (417)	Tension and moment	0.034	Pass
4	49	B5	168.3x168.3x12 CH5 (417)	Tension and moment	0.120	Pass
4	49	B6	168.3x168.3x12 CH5 (417)	Tension and moment	0.120	Pass
4	49	B7	168.3x168.3x12 CH5 (417)	Tension and moment	0.120	Pass
4	49	C1	168.3x168.3x12 CH5 (417)	Tension and moment	0.120	Pass

Member Group No	Member No	Load case	Section	Critical Check
4	108	C3	168.3x168.3x12 CH5 (417)	Deflection
6	1370	C2	139.7x139.7x10 CH5 (426)	Deflection
12	1680	C2	193.7x193.7x16 CH5 (408)	Compression and moment - buckling

Ismail’s 23-year relationship with SuperSUITE indicates how satisfied he is with the software and his working relationship with Integer. He has grown with the software, as has the complex nature of his projects. He has benefited from the regular upgrades, and the responsive nature of phone and email technical support means he is confident of finding a solution to any problem that may arise.