

**IN THE MATTER OF AN ARBITRATION
UNDER THE SCCA RULES OF ARBITRATION
BETWEEN:**

ARABIAN INTERNATIONAL COMPANY FOR STEEL STRUCTURE

Claimant

-and-

SHAPPORJI PALLONJI MIDEAST LLC

Respondent

SABIC Jubail New Building

Expert Joint Statement -Structural Engineering

20 November 2024

Expert for Claimant: Riccardo Magarotto

Expert for Respondent: Ian Burns

INTRODUCTION

1.1.1 The expert appointed by the Claimant, Arabian International Company for Steel Structures is Mr. Riccardo Magarotto of Maffei Engineering SPA. The expert appointed by the Respondent, Shapporji Pallonji Mid East LLC is Mr Ian Burns of HKA Global Ltd. Collectively they are referred to in this Joint Statement (JS) as the Experts.

1.1.2 This First Joint Statement sets out the areas of agreement and disagreement of the Experts in matters of disruption that relate to structural engineering and architecture.

1.1.3 Where the Experts have been able agree on principles or issues, we have done so. Where we have been unable to agree, we have stated our positions and reasons for disagreement.

1.1.4 The Experts have met, corresponded via email, and exchanged information as necessary during the preparation of this JS.

1.1.5 This JS should be read in conjunction with the Experts' respective reports in this field of expertise. The Experts have prepared the following expert reports in relation to engineering issues:

a) Technical Reports:

- i) Task 1) Technical Advice on Sabic Tower Steel connection Weight AIC-016-FE-RP002_REV00, prepared by Mr Riccardo Magarotto, dated 26 January 2024
- ii) Task 2) Technical Advice on Temporary Towers Weight AIC-016-FE-RP003_REV00, prepared by Mr Riccardo Magarotto, dated 24 January 2024
- b) Expert Report of Riccardo Magarotto, prepared by Mr Riccardo Magarotto, dated 1 July 2024,
- c) Expert Report of Ian Burns, prepared by Ian Burns, dated 21 May 2024, and;
- d) Second Expert (Reply) Report of Ian Burns, prepared by Ian Burns, dated 26 August 2024.

1.1.6 The Expert's reports were exchanged at different times during 2024. This JS includes responsive content resulting from review of the other Expert's report.

SABIC Jubail New Building

Expert Joint Statement -Structural Engineering

1.1.7 The Experts were instructed as follows:

- a) Mr. Magarotto has prepared his Expert Report of 1 July 2024 on the basis of the following instructions, i.e..
- i) "We have been requested to provide, through this report, our independent technical expert opinion on the Respondent's expert report prepared by Mr. Ian Burns, dated 21 May 2024.
- ii) "We have been requested to provide our independent expert opinion of the feasibility of designing structural steel connections on the SABIC Headquarters Building without a computer generated 3-D model, and the likely impact of such a procedure on the weight of the connections. "
- iii) "We have been requested to provide our independent expert opinion, based on our experience, of the standard industry practice regarding the design obligations of the structural steel contractor on a project such as the SABIC Headquarters Building, with respect to the permanent structure, connections, and temporary supports. "
- iv) "We have been requested to provide our independent expert opinion on the documentation that would typically be provided to the party responsible for designing the connections and temporary supports. "
- v) "We have been requested to provide our independent expert opinion on whether the documentation described in our response to the foregoing inquiry is reasonably necessary to design efficient and cost-effective connections and temporary support structures for a project such as the SABIC Headquarters Building. "
- vi) "We have been requested to provide our independent expert opinion on the effect of SABIC's letter dated 16 August 2018a copy of which is attached for reference, on AIC's scope of work. We are to assume that AIC's original scope provided that "AIC have unrestricted responsibility to select the reasonable connection subject to approval of Engineer/Client", and that at that time there was no viable ETABS or other structural three dimensional model available for the project. "
- b) Mr Burns was instructed to comment on the following section of Mr. Magarotto's expert report:

“Your report should address the technical matters which arise from the replying pleadings and the second expert report of Giovanni Zizioli, including the following:

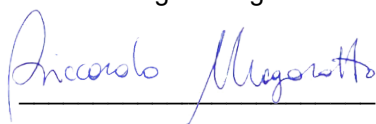
- 1. Please provide your opinion as to what you would expect a prudent and experienced contractor to consider and cater for at the tender stage in respect of any design obligation. See in this regard paragraph 2.20 of the replying pleading.*
- 2. Where the design of the connections are within a contractor’s scope of works would a reasonably experienced contractor need a model to design the connection and what is the industry standard in respect of this model.*
- 3. If the contractor is not required to design the connections, would an experienced contractor require a model to fabricate and install the connections.*
- 4. In your opinion would the design of the connections as instructed by Thornton Tomasetti (“TT”) be considered to be reasonable and in accordance with a design that would be usual within the industry norms and not excessive in its design. In this regard see also comments on the report of Maffei Engineering below.*
- 5. Carry out an assessment and verification of the design by comparing the design provided in the tender drawings against the design provided by TT immediately after the Employer instructed the omission of the connection design and comment on the consequences of your findings.*
- 6. Would the omission of the design responsibility for the connections and the instruction to fabricate and build in accordance with the design provided by TT have caused additional time and costs from that contemplated at tender stage (see in this regard paragraph 42 of the Statement of Claim and paragraph 4.8 of the replying pleading)?*
- 7. Please consider the Claimant’s Expert Technical Report prepared by Maffei Engineering and comment as appropriate, including:*
 - i. Comment on the opinion that the Diagrid connections provided by TT were “non-standard and more complicated excessively heavy connections” (page 6 and paragraph 7.3(C));*

- ii. *Comment on the opinion that the design for the temporary towers is “excessively overdesigned and costly” (page 7);*
- iii. *Comment on the adequacy of the design information provided to the Claimant by TT (paragraph 4.4);*
- iv. *Respond in detail to paragraph 7.”*

- 1.1.8 Each Expert uses defined terms in their original report, and in certain instances, those terms are used in this JS.
- 1.1.9 Where we may have commented on points of contract interpretation, we have done so only to the extent necessary to comment on technical issues.
- 1.1.10 The absence of a comment on a particular issue should not be interpreted as meaning that one Expert agrees with the view expressed by the other Expert in JS or in the other Expert’s report(s).
- 1.1.11 In the event that further information becomes available, the Experts may revise their opinions accordingly.
- 1.1.12 Our respective positions are set out in **Table 1 Schedule of Areas of Agreement and Disagreement**.
- 1.1.13 This schedule is arranged to allow both experts to give views on each other’s instructions from their respective counsel in Sections 1 and 2, and then respond to other issues raised by both experts on both the Diagrid connection design and the Temporary Works in Sections 3 and 4.

20 November 2024

For the Claimant
Maffei Engineering SPA



For the Respondent
HKA

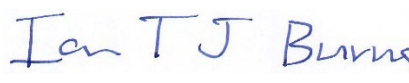


Table 1 - Schedule of Areas of Agreement and Disagreement

Item	Issue to be Discussed	Agreed?	Items Not Agreed and/or comments	
			Mr Magarotto's Views	Mr Burns' Views
	Issues Arising from Claimant's Expert's Instructions			
1.1	It is feasible to design structural steel connections on the SABIC Headquarters Building without a computer generated 3-D model, and, if so, what is the likely impact of such a procedure on the weight of the connections.	Both Experts agree that the design of structural steel connections on the SABIC Headquarters Building without a computer generated 3-D model is theoretically possible, but impracticable in today's engineering environment. For sure, the use of a 3D model allows for fully optimized design of the connections, minimizing the connection weight, as the 3D model provides the designer with the actual design forces and the real geometry of each analyzed node.	Refer to 4.1 of Maffei's Expert report dated 01 July 2024 Note: The lack of 3D structural model leads inevitably to overdesigning, with big increase of the final weight of the connections and cost implications.	I don't agree with Mr. Magarotto's comment.
1.2	What would be considered as the standard industry practice regarding the design obligations of the structural steel contractor on a project such as the SABIC Headquarters Building, with respect to the permanent structure, connections, and temporary supports.	Both Experts agree that standard industry practice would require the structural steel contractor scope of works to carry out the connection design, and erection analysis with the design of the required temporary elements, before fabrication commences. The steel contractor usually carries responsibility for these design activities. It would be unusual for a structural steel contractor to have obligations to carry out any validation of the analysis and design of the permanent structure, unless specifically requested and written in the contract.	Refer to 4.2 of Maffei's Expert report dated 01 July 2024	N/a

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Item	Issue to be Discussed	Agreed?	Items Not Agreed and/or comments	
			Mr Magarotto's Views	Mr Burns' Views
1.3	What is the documentation that would typically be provided to the party responsible for designing the connections and temporary supports.	<p>The Experts both agree that the documentation to be provided would typically include IFC drawings and structural reports (at least), covering all architectural and structural aspects for a full and comprehensive understanding of the building by a third-party.</p> <p>They disagree on the necessity for a 3D analysis model, even though an ETABS model was provided with the tender documents.</p>	<p>Refer to 4.3 of Maffei's Expert report dated 01 July 2024 – <i>"The documentation that would typically be provided to the engineering consultant responsible for the design of the connections and temporary supports, is the so-called design pack. The design pack consists of IFC drawings and structural reports (at least), covering all architectural and structural aspects for a full and comprehensive understanding of the building by a third-party. For complex building such as the SABIC Headquarters the design pack always includes 3D geometrical models (such as the Revit model) and the 3D analysis FEM model (such as the ETABS model). These models are required to be part of the design pack to provide all information for complex buildings, where simple 2D drawings and reports are not sufficient or adequate to do so."</i></p>	<p>Refer to HKA Expert report of 12 August 2024 – para 8.3.5 – <i>"In my opinion, a reasonably experienced contractor would be able to design the connections if provided only the loading information and the member end forces at each connection, but this would be a complex, time consuming and inefficient process."</i></p>

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			Mr Magarotto's Views	Mr Burns' Views
1.4	Is the documentation described in item 1.3 is reasonably necessary to design efficient and cost-effective connections and temporary support structures for a project such as the SABIC Headquarters Building	Not agreed	<p>Refer to 4.4 of Maffei's Expert report dated 01 July 2024</p> <p><i>"The design pack provided by TT for the SABIC building failed to convey to the fabricator engineering consultant all necessary information to design efficient and cost-effective connections and temporary support structures. Therefore, the documentation mentioned in our response would have been required."</i></p> <p>In addition to that, it is important to notice that apart from the ETABS model, which in itself was not workable, no other documents within the SABIC design pack contained the connection loads in a clear readable form, made available to the steel contractor to proceed with the connection design. Indeed SPB notified this lack of information to SPML when instructed to proceed with the connection design without the ETABS model. The connection design forces should have been provided in a clear and accessible form (like tables, which are typically included in the IFC drawings and placed beside the connection details they refer to).</p>	<p>Refer to HKA Expert report of 12 August 2024 – para 8.3.5 –</p> <p><i>"In my opinion, a reasonably experienced contractor would be able to design the connections if provided only the loading information and the member end forces at each connection, but this would be a complex, time consuming and inefficient process"</i></p>

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Item	Issue to be Discussed	Agreed?	Items Not Agreed and/or comments	
			Mr Magarotto's Views	Mr Burns' Views
			In my opinion the initial approach used by TT was considering the ETABS model as part of the tender pack, to be used for both the connection design and the temporary works design.	

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			Mr Magarotto's Views	Mr Burns' Views
1.5	What is the effect of SABIC's letter dated 16 August 2018 on AIC's scope of work.	Not agreed.	<p>Refer to 9.1 of Maffeis Expert report dated 01 July 2024 – <i>"The letter states that the primary steelwork and all the connections related to it are fully finalized, for both permanent and temporary load case scenarios. The letter excludes any possibility of performing further design review of the primary structure/connections as deemed unnecessary, and actually pushes SPML to proceed with fabrication, based on and fully consistent with the IFC package. In our opinion this clearly is as a major change in the subcontractor scope of works and conditions, as AIC no longer appear to have the possibility of preparing and submitting their own connection design for the primary structure. With this letter, the contractor removes in practical terms the connection design from the steel fabricator scope of works, and instructs them to proceed with the IFC solution. [...].</i></p> <p>This letter, combined with the unavailability of a workable 3D model, effectively removes connection design from AIC's scope of work.</p>	<p>The construction phasing and propping indicated in the IFC documentation can only be considered as indicative as the temporary works design was clearly within AIC's scope of work. It is understood that AIC were involved in the definition of TT's new scope of work after the issue of this letter and that AIC worked collaboratively with TT to develop construction sequencing and for TT to revise any details as a result. As SPML's structural steel subcontractor, AIC had ample opportunity to influence the ongoing temporary works design.</p>

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Item	Issue to be Discussed	Agreed?	Items Not Agreed and/or comments	
			Mr Magarotto's Views	Mr Burns' Views
2.0	Issues arising from Respondent's Expert's Instructions			
2.1	What would a prudent and experienced contractor be expected to consider and cater for at the tender stage in respect of any design obligation	Agreed A prudent and experienced contractor is expected to consider the information available at tender stage for any elements of the design for which it has a design obligation, and to identify any apparent deficiencies in this information during the tender process. It would not normally be expected that the tenderer verify the design information during the tender stage.	Note - In my opinion, none of the issues involved in this case involve defects and deficiencies that would have been discoverable by a reasonably prudent contractor.	N/a
2.2	Where the design of the connections is within a contractor's scope of works would a reasonably experienced contractor need a model to design the connection and what is the industry standard in respect of this model	Agreed A reasonably experienced contractor would require a 3D calculation model to design the connections efficiently. It might be able to design the connections if provided only the loading information and the member end forces and geometry at each connection, but this would be a complex, time consuming and inefficient process. There is no particular industry standard in respect of analysis software, as the market offers multiple valid options for calculation and design.	N/a	N/a

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			Mr Magarotto's Views	Mr Burns' Views
2.3	If the contractor is not required to design the connections, would an experienced contractor require a model to fabricate and install the connections.	<p>Both Experts agree that for such a complex project a 3D geometrical model (i.e. Revit/Tekla) would be required to detail each connection for fabrication and for subsequent installation, while 3D calculation model would not necessarily be required (i.e. ETABS), if connection design is not part of the scope of works. The geometrical model would be assembled by the steelwork subcontractor to suit their own requirements.</p> <p>The Experts disagree on the fact the 3D analysis model is required to carry out the design of the connections.</p>	<p>Besides that, ETABS model is required when the steel fabricator is to carry out connection design and temporary works design, for such a complex project.</p> <p>However, I understand that the main point of contention in this case is based on the contention that AIC originally had design responsibly that was subsequently removed from its scope.</p>	N/a

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			Mr Magarotto's Views	Mr Burns' Views
2.4	Would the design of the connections as instructed by Thornton Tomasetti ("TT") be considered to be reasonable and in accordance with a design that would be usual within the industry norms and not excessive in its design.	Not agreed	With reference to Maffei's report AIC-016-FE-RP002_REV00, the diagrid connections designed by TT are found non-standard and unnecessarily too heavy. Indeed, it would be easy for a steel connection specialist to find lighter alternative solutions, as Maffei's have done for the most representative samples (types) of diagrid connections. The independently designed connections are all characterized by specific arrangement that satisfies the typical buildability, the lifting and assembly, in line with typical site conditions. A comparison model providing a visual indication of the difference in the IFC model implemented on site and my design is attached to this report as exhibit A.	Refer to HKA Expert report dated 26 August 2024 – para 8.5 – “8.5.2 - <i>In my opinion, and on the basis of my overview of the connection details shown in the Rev. 0 drawing issue, I consider the design of the connections to be reasonable and to an industry standard level of information based on my own experience.</i> 8.5.3 - <i>With regard to the suggestion that the TT connection design is “excessive”, I consider this to be a subjective comment raised very late in the project. I note the limited extent of change to the details included in the original Rev. 0 drawing issue by the time of the Rev. 1 drawing issue.</i> “

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			Mr Magarotto's Views	Mr Burns' Views
2.5	Compare the design provided in the tender drawings against the design provided by TT immediately after the Employer instructed the omission of the connection design and comment on the consequences of your findings	Agreed – in part	<p>Maffeis have been instructed to compare the as-built solutions for the connections to Maffeis' solutions in terms of weight. I agree that the level of revision is unusual on a project of this scale and complexity and I would have expected far more changes of greater significance, particularly given the August 2018 instruction and the transition from the original requirement for contractor designed connections to a fully designed solution.</p> <p>It appears that almost no effort was put by TT in trying to minimise the weight of their initially overdesigned connections when instructed to proceed with the connection design. In addition to this, AIC had to notify TT in multiple occasions that TT's designed connections according to the IFC pack were not applicable to the real actual case as clashing with members or simply not buildable, so AIC had to request new different design suitable for the real site conditions.</p>	<p>Refer to HKA Expert report dated 26 August 2024 – para 8.6.3 – <i>"In my experience, this limited level of revision would be unusual on a project of this scale and complexity and I would have expected far more changes of greater significance, particularly given the August 2018 instruction and the transition from the original requirement for contractor designed connections to a fully designed solution."</i></p> <p>This part of Maffeis' Expert comment is contradicted by my understanding that the as-built connection designs are different to the IFC design and in some cases more efficient. I have not been instructed to review the as-built drawings.</p>

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			Mr Magarotto's Views	Mr Burns' Views
2.6	Would the omission of the design responsibility for the connections and the instruction to fabricate and build in accordance with the design provided by TT have caused additional time and costs from that contemplated at tender stage	Statement This is matter on which a quantum and delay expert should opine.	N/a	N/a

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			Mr Magarotto's Views	Mr Burns' Views
2.7	Comment on the opinion that the Diagrid connections provided by TT were "non-standard and more complicated excessively heavy connections"	Not agreed	<p>With reference to Maffei's report AIC-016-FE-RP002_REV00, diagrid connections designed by TT are found non-standard and more complicated excessively heavy connections. It would be easy for a steel connection specialist to find lighter alternative solutions, as Maffei's have done for the most representative samples (types) of diagrid connections. The independently designed connections are all characterized by specific arrangement that satisfies the typical buildability, the lifting and assembly, in line with typical site conditions.</p> <p>A comparison model providing a visual indication of the difference in the IFC model implemented on site and my design is attached to this report as exhibit A.</p> <p>Not agree with the side comment 8.8.4 – This has nothing to do with the stated issue.</p>	<p>Refer to HKA Expert report dated 26 August 2024 – para 8.8 i)–</p> <p><i>"8.8.3 - In my opinion, the approach adopted by Maffei in their Expert Report is entirely subjective and the opinion that connections were "non-standard and more complicated excessively heavy connections" is being raised after the fact.</i></p> <p><i>8.8.4 - I comment on the validity of the "statistical" approach adopted by Maffei in its original Report in my Stage 1 Report. In my opinion there are far more diagrid connection variations than are accounted for in Maffei's approach and this "statistical" approach is an over-generalisation of the actual situation on the project."</i></p>

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2.8	The design for the temporary towers is "excessively oversized and costly"	Not agreed	<p>With reference to the Report AIC-016-FE-RP003_REV00), temporary towers designed by TT are found excessively oversized and costly. This expert opinion is based on the results coming from the structural analysis of the Temporary Tower, reviewed by Maffei. Most of the members have very low utilisation ratios, while fully optimised solution should have utilisation ratios just below 100%. Note that the Utilisation Ratio is the only structural parameter the structural designer uses to see if a structural member is oversized or not.</p> <p>Potential external factors such as site conditions, site access, crane arrangements, purchase/rental of site machines/equipments, material availability in the market, reuse/resale of temporary steel, depend on the contingency and are at the exclusive discretion of the steel fabricator.</p> <p>All these external parameters are known the best by the steel fabricator, which is the only one that can govern and decide on. However, they would have little/negligible impact on the final</p>	<p>Refer to HKA Expert report dated 26 August 2024 – para 8.8 ii) - "8.8.11 - None of the above have been taken into consideration in Maffei's statement that "temporary towers is excessively oversized and costly". The opinion is solely on a review of the working ratios of single members within the structural model (ETABS model) without due consideration given to any of the potential external factors which the designer would have had to contend with in producing its design."</p> <p>8.8.12 - As noted in Section 8.3 above, AIC engaged in the review of the draft Scope of Services for TT, during which they had opportunities to raise concerns related to design optimisation and potential cost-saving measures. The feedback provided during this phase would have been crucial in shaping the final Scope of Services, ensuring that both technical and financial objectives could be aligned.</p> <p>8.8.13 - Following the finalisation of the Scope of Services, AIC continued to have regular opportunities to influence the</p>

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			Mr Magarotto's Views	Mr Burns' Views
			<p>member weight, as they have no influence on the member verification itself.</p> <p>Also, the temporary tower design by TT does not consider the construction sequence.</p> <p>Considering the construction stages in the analysis would allow for further improvements of the efficiency of the structure and would lead to an even lighter solution.</p>	<p><i>design of the temporary works during the subsequent design meetings. These meetings would have provided the platform for AIC to offer input regarding the refinement of the design to enhance efficiency and reduce costs or to raise any potential issues regarding procurement materials within the proposed design.</i></p> <p><i>8.8.14 - In my opinion, Maffei's position that the design for the temporary towers is "excessively overdesigned and costly" does not accurately reflect the reality of designing temporary works as no consideration has been given to external factors which affect the design."</i></p>
3.	Other Issues related to the design of the Diagrid connections			
3.1	At the time of the contract award, the responsibility for connection design remained with the structural steel sub-contractor, AIC	Both experts are in agreement that AIC were responsible for the connection design at the time of contract award.	N/a	N/a
3.2	The main contract between SABIC and SPML gave the opportunity for value engineering, subject to SABIC approval of the VE proposals	Not agreed	This is a contractual issue. Opportunities for VE are irrelevant to the case.	AIC, through SPML, had the opportunity to carry out a VE exercise on the connection design according to the contract.

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			Mr Magarotto's Views	Mr Burns' Views
3.3	The sub-contract between SPML and AIC gave the opportunity for value engineering.	Not agreed	This is a contractual issue. Opportunities for VE are irrelevant to the case.	AIC had the opportunity to carry out a VE exercise on the connection design and temporary works according to the subcontract with SPML.
3.4	These VE opportunities were applicable to all parts of the structure, including the connection design	Not agreed	<p>Connection design should not be considered as VE. The connection design is part of AIC responsibility and scope of works; SPML or SABIC should play no roles in governing/deciding about the steel connection design (which should stay at the steel fabricator sole discretion), as long as the appointed engineer developing the connection design is providing structural design abiding by the code and in accordance with the permanent works engineer (TT) wireframe design and in accordance to the architectural requirements. When all architectural and structural requirements are met in the independent connection design (not in line with the IFC documentation), it is consolidated standard practice that the client (or their consultant) proceeds with the approval.</p> <p>Not agreed with side comment – when connection design is part of the steel fabricator scope of works, it is standard practice to develop an independent design different from the</p>	<p>Mr Magarotto's view would be appropriate only if their connection design matched exactly the designs given in the IFC documentation. Any change to these details would have</p>

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			IFC drawings, in particular in case of non-standard connections, like the diagrid connections. The approval coming from the client - SABIC- (and/or their consultant -TT-) is finalised to verify the new connection design is structurally and architecturally acceptable.	to be approved by SABIC and their consultants, TT.
3.5	The design and detailing of structural steel connections would have been possible with the documentation provided in the tender for the project	Not agreed	The documentation provided in the tender pack does not allow for the independent design of the connections, as it is required to have a workable 3D analysis model (ETABS). Not agreed with side comment – In my opinion, the period that goes from the contract award to the first RFI raised on the 11 June 2018 would be the average technical time required to hire an engineer and get them started with the study of the tender documentation and with the engineering design.	Models were provided, with the contract award and updated in 20 May 2018. AIC raised their first RFI for clarification on ETABS model "deficiencies" on 11 June 2018 and these deficiencies were further queried by SBP on 26 July 2018. It remains unclear as to what design work, if any, had been progressed during the period between contract award in April 2018 and the SBP queries in July 2018.
3.6	Diagrid connection design details were provided within the tender documentation	Not agreed	Connection details were provided but not the connection forces in a clear form to allow for independent design. Not agree with the side comment - Loads included within the calculation	

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			report were found to be non processable and inconsistent by SBP – refer to SBP Letter dated 26 July 2018	The connection forces were provided in tabular form in hard copy – SBP have confirmed this in their reports.
3.7	The design information provided at tender stage to the Claimant by TT was adequate for tender	Agreed – in part	The design information provided was sufficient and adequate for bidding. but was found just after the project award to be insufficient and not adequate for the independent design of the connections and for the temporary works design.	Agreed Not agreed – this was not known at the time of bidding
3.8	Alternative forms of connection design were offered within the contract documentation, i.e. options for welded connections as well as bolted connections were provided	Agreed The IFC drawings show alternative bolted/welded solutions for some connections.	N/a	N/a
3.9	An ETABS model was provided as part of the tender pack	Agreed – in part	Yes, there was a non workable 3D ETABS model included in the tender submission. Not agreed with side comment – As mentioned by Mr. Burns' Expert Report dated 26 august 2024 in 8.2.7, where he states " <i>I would not expect the tenderer to verify the design information during the tender stage</i> ", the tenderer is not expected to verify the ETABS model before it is awarded of the project. The period of time between the project award and the first raised RFI appears to be in	An ETABS model was provided at tender, but we understand that this was not checked in any way during the tender period by AIC. Had a more proactive approach been taken earlier by AIC after contract award, the any apparent deficiencies in the ETABS model could have resolved much sooner than July 2018

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			line with the standard practice, given the complexity of this project.	
3.10	This ETABS model provided sufficient information for the design of the structural steel connections	Not agreed	No, as the ETABS model provided within the tender pack was non workable. Refer to SBP letter dated 26 July 2018	See my comment on 3.9 above.
3.11	It would have been possible (if inefficient/impractical) to design and detail the steelwork connections without a fully working structural analysis model being provided	Agreed – in part Generally speaking, it is theoretically possible, but definitely not practical, inefficient and time consuming for such a complex project as SABIC Headquarter.	In order to run the connection design without a structural analysis model it is required to be provided with the connection loads in a clear form like tables (which are in general included in the IFC drawings and placed beside the connection details they refer to) as part of the design pack. The tender documentation for the SABIC building did not include this sort of processable and consistent documentation. For the SABIC project it is not at all realistic to proceed without a 3D ETABS model.	Tables of geometry and loadings were in fact provided in the tender pack – SBP confirmed in their report that they attempted to convert this information into a digital form for importing into SBP's own "Sofistik" model
3.12	The IFC drawing provided options for welded and bolted connections	Agreed The IFC drawings show alternative bolted/welded solutions for some connections.	N/a	N/a
3.13	In their Task 1 Report, Maffei confirm that they have used the ETABS model provided by TT – in doing so, did Maffei run checks for dimensional accuracy and/or structural stability before using the data	Statement	No, the received ETABS model has been used in "read mode" only to preserve its original integrity and extract the geometry and connection forces to proceed with the independent design of selected representative samples (types) of connections.	No comment

Table 1 - Schedule of Areas of Agreement and Disagreement

Item	Issue to be Discussed	Agreed?	Items Not Agreed and/or comments	
			Mr Magarotto's Views	Mr Burns' Views
	from the model for your own connection design?		The analysis model has been kept immaculate as received from the permanent works engineer (TT). No structural checks have been carried out on the ETABS model, under the assumption the permanent works engineers did all required structural checks and verifications according to the valid structural codes.	
3.14	Were the Maffei's connection designs compared with the Rev. 1 IFC documentation, or did Maffei's have access to the as-built connection design information?	Statement	Refer to report AIC-016-FE-RP002_REV00. The comparison of the connections is done in terms of weight between the Maffei's solutions and the as-built final installed solutions, so it was possible to quantify by difference the amount of unnecessary steel that could have been spared from the purchase, fabrication and installation processes and identifies the avoidable costs and economical damages faced by AIC. Not agree with the side comment – AIC was instructed to proceed with the IFC details. The scope of collaboration between AIC and TT is unknown.	I was not given access to the as-built information, but I understand that there were significant revisions between IFC and as-built stages made to the connection designs. Since AIC were working collaboratively with TT throughout the post-August 2018 period, they would have had the opportunity both to agree to these changes and to comment if it was felt that the revised design was “overdesigned”.
3.15	Did AIC have any design obligations with respect to the	Agreed No design obligations with respect to the wireframe.	N/a	N/a

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	wire frame at the time of contract award?			
3.16	Was the connection design provided with the tender documentation designated as final as per the notes?	Agreed The drawing notes said that all connections were to be designed by the contractor unless they were designated as "final" – I note that none of the connections were designated as "final" in the IFC documents	N/a	N/a
3.17	Did AIC have a right to design the connections "irrespective of the connection design in the tender documents" under the contract?	Not Agreed	Yes, by contract AIC was granted the right to run their own independent design for the connections, irrespective of the details shown in the tender documents.	This wasn't a right – more an opportunity to offer alternative connection designs subject to SABIC's agreement and approval.
3.18	Was AIC's right to design the connections withdrawn by the Employer/Respondent during construction of the project?	Not Agreed	Yes, at the time the contractor SPML removed the connection design from AIC scopes of works, AIC was still carrying the right of providing their own independent design for the connections. SABIC's letter of 16 August expressly instructs AIC to proceed with the IFC drawings only, stating the connections are fully designed, considering ETABS model and calculation report for information only.	No. SABIC's letter of 16 August 2018 does not expressly remove AIC's opportunity to offer alternative connection designs
3.19	Is it feasible or industry practice for a tenderer to verify the connection design during the tender process?	Not Agreed	Since the connection design was a part of AIC's scope of works, it would not be common practice for AIC to verify the connections included in the IFC drawings. It would actually be a waste of time and resources proceeding in verifying the IFC	In my opinion, there a prudent steelwork subcontractor should have at least a high level review of the connection design through the process of validation of quantities/availability and I would have expected that a firm of AIC's

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			connection design during bidding stage. AIC would have been expected to rely on its experience and preliminary sizing to price for the connections they would like to install.	reputation would be reviewing from a technical viewpoint as well to be able to raise tender queries.
3.20	Have either experts been involved in a project even close to the complexity of the SABIC building where the structure and connections have been designed without the assistance of computer generated 3D models in the last ten years?	Agreed	No, it has never happened to me to be involved on projects like SABIC building without the assistance of 3D models. As a structural engineer specialised in steel structures, steel connection design and temporary works design, I had the opportunity to work on several buildings of similar level of complexity to the SABIC buildings and I categorically exclude being possible to proceed with the engineering design without the assistance of a computer generated 3D model.	It would be unusual for a project of a similar complexity to be designed without the use of a 3D analytical computer model. The SABIC project structure and connections have in fact been designed to IFC level using ETABS analysis and design software.
3.21	Is the engineer that prepares the ETABS model and design reports responsible for the accuracy and consistency of those documents?	Agreed Yes – and it would be normal practice for any queries and apparent discrepancies or queries to be raised as early as possible to allow “the engineer” to resolve these in a timely manner	N/a	N/a
3.22	Is it reasonably possible or standard practice for a tenderer to verify the consistency of the ETABS model and the design reports prior to tendering?	Not agreed	It is not standard practice to verify the consistency of the ETABS model and of the design reports prior to the tendering, as all tender documents are received under the assumptions their content is accurate, correct, consistent and valid.	

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			Mr Magarotto's Views	Mr Burns' Views
			Note – Mr. Burns' comment appears to be in contradiction with his Expert Report dated 26 august 2024 in 8.2.7, where he states " <i>I would not expect the tenderer to verify the design information during the tender stage</i> "	In my opinion, a prudent steelwork subcontractor should have had at least a high level review of the connection design and I would have expected that a firm of AIC's reputation would be reviewing from a technical viewpoint as well to be able to raise tender queries.
3.23	Given the information provided in the SBP letter dated 26 July 2018, did AIC/SBP have sufficient information to design the connections?	Agreed, partially No, AIC/SBP didn't have sufficient information to proceed with the design of the connections and SBP made their concerns clear in that letter. The Experts do not agree on the amount of time that took from the project award to the first raised RFI.	The period of time between the project award and the first raised RFI appears to be in line with the standard practice, given the complexity of this project.	What isn't clear is why it took so long to raise these concerns.
3.24	Was AIC responsible for developing the missing information, as cited by SBP in its letter dated 26 July 2018, as part of its connection design responsibility?	Agreed No. AIC's design consultant, SBP, raised a number of queries on missing information in this letter, which is reasonable, but it would not be reasonable to expect AIC to resolve this issue themselves. It is the permanent works engineer (i.e. TT) responsibility to provide all required missing information.	N/a	N/a
3.25	Would the issues identified in SBP letter dated 26 July 2018 reasonably prevent an experienced steel contractor from designing efficient connection designs?	Not agreed	Yes	The issues raised by SBP may well have been valid, but it took, quite some time to raise them and, In my opinion, there is no demonstration of a collaborative approach to resolving the issues raised in SBP's letter other than intimating a

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				requirement for a new design fee and an extension of time.
3.26	Is the main structural designer responsible for the structural design documents that they produced, including IFC drawings, design reports, and any ETABS/REVIT models provided in the tender documents?	Agreed	Yes, design engineers are responsible for their work product. Where errors or deficiencies are found in their design it is their responsibility to correct such errors. Construction contractors do not have design responsibility unless it is expressly assumed in the contract.	N/a
3.27	Would an experienced and prudent steel contractor that had responsibility for the connection design fabricate and install the structural steel if it had in its possession design documents, including 3D models, that reveal inconsistencies between the design report, the drawings, and the model?	Agreed	Absolutely not. To do so would potentially risk the catastrophic collapse of the building. It is the permanent works engineer responsibility to correct such discrepancies and errors.	This is a hypothetical situation that did not arise on this project. Contractors have an obligation to raise queries in situations where they are not satisfied of the accuracy of the design information received - this procedure was followed on this project
3.28	Were the connection details in the IFC drawings issued by TT, in the original tender, or subsequently, reasonably efficient by industry standards?	Not agreed	No, details were not efficient and too costly for the industrial standards. In some cases, they have proved being not applicable to real cases or buildable. Refer to the report AIC-016-FE-RP002_REV00. A comparison model providing a visual indication of the difference in the IFC model implemented on site	Yes – as evidenced by AIC willingness to proceed with the fabrication in accordance with the Rev. 1 details and the support and advice provided by TT post August 2018. I have raised my concerns regarding the inappropriate nature of the introduction of any new exhibits to

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			<p>and my design is attached to this report as exhibit A.</p> <p>Note to Mr. Burns side comment – The 2no. connections shown in Exhibit A in the right hand side of the pages and discussed in the report AIC-016-FE-RP002_REV00 are the final TT design from IFC drawings rev00 and rev01 which have been used under the instruction of SPML for fabrication and erection, and therefore implemented on site.</p> <p>For these cases, the welded alternatives were not compatible with the erection method and therefore were discarded.</p>	<p>this Joint Statement. I have asked Mr. Magarotto to identify where in any of Maffeis' 3 no. technical reports the diagrams included in exhibit A have been shown, but this has not been confirmed.</p> <p>I note the reference, “ in the model implemented on site...” in Mr. Magarotto's views – Maffeis' report ref. AIC-016-FE-RP002_REV00, paragraph 2 refers specifically to AFC drawings by TT revisions 00 and 01 and does not refer to as-built drawings, so it is not possible to confirm from the Maffeis reports if the details show in exhibit A are, in fact, implemented on site.</p> <p>It is important to note that the TT AFC (IFC) drawings rev. 00 included alternative connection details for welded, rather than bolted connections – these alternative details appear to have been disregarded both in Maffeis' original reports and in exhibit A.</p> <p>I note Mr Magarotto's comment regarding compatibility of TT's welded connection alternatives – I have not seen any evidence to confirm this statement.</p>

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3.29	Did HKA check any of the Maffei's designs for technical suitability? Are there any problems with the technical sufficiency of the Maffei's report? If so, what are they?	Statement	Note to Mr. Burns side comment – Maffei's design was done starting from the ETABS model, available to all parties. HKA have never requested details, connection reports, etc for their review. That information would have been provided upon request.	Maffei's have only given examples of their designs within their original reports and insufficient design information or calculation to allow HKA to check their design. In addition, such a detailed review was not included in the Respondent's brief to HKA
3.30	Is the structural design of the connections contained in report AIC-016-FE-RP002_REV00 and designed by Maffei's technically sound and suitable for construction?	Not agreed	Yes, all connections contained in the report AIC-016-FE-RP002_REV00 have been designed, calculated, and verified according to the structural codes, for the design loads extracted from the working ETABS models. They are suitable for constructions & installation and consider the material availability on the market and all typical site conditions, including craneage, lifting accessibility and installation methods.	As stated in our report dated 26 August 2024, para. 8.8.20 - <i>"In conclusion, I consider the Claimant's Expert Reply Report to be subjective, theoretical and after the fact, and fails to recognise any practical considerations that may have influenced the connection design."</i>
3.31	Are the designed connections contained in report AIC-016-FE-RP002_REV00 produced by Maffei's and selected for the study reasonably representative samples of all the connections in the entire building?	Not agreed	Yes, refer to report AIC-016-FE-RP002_REV00	Maffei's had the advantage of seeing the as-built details and could therefore have formed an accurate view of the efficiency (or otherwise) of the finalized connection design. In my opinion, the "scientific" approach adopted by Maffei's is subjective and therefore inappropriate.
3.32	If AIC/SBP had been provided with sufficient information, as indicated in the SBP letter, is it more likely than not that they	Not agreed	Yes, there is nothing particularly special, unusual, or groundbreaking in the Maffei's design. It is simply a normal design using best practices	SBP were slow to raise their queries; I can't comment on the hypothetical outcome had SBP been quicker to raise their queries and

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	would have produced connections at least as efficient as those produced by Maffei's?		developed with a view to optimise the efficiency and minimising weight wherever reasonable possible, without sacrificing safety.	progress the connection design as I can't form a view on what SABIC and their designer would or would not have agreed to by way of alternative connection designs.
3.33	If AIC/SBP had been provided with sufficient information, as indicated in the SBP letter, is it more likely than not that they would have been able to realize weight savings at least equal or greater than those produced by Maffei's study?	Not agreed	Yes, this appears to be the most likely scenario.	The question is hypothetical and therefore moot – refer to my comment on item 3.33 above
4.	Other Issues related to Temporary Works			
4.1	At the time of the contract award, the responsibility for temporary works remained with the structural steel sub-contractor, AIC	Agreed	N/a	N/a
4.2	The documentation relating to temporary works issued at the time of award was indicative only.	Agreed	N/a	N/a
4.3	Based on the IFC information received, AIC should have been able to develop a construction sequencing philosophy and from that, a temporary works design.	Agreed, partially IFC drawings gave a very high-level indication of construction sequencing and propping. The temporary works design was clearly part of AIC's scope to develop a comprehensive construction sequence and	IFC drawings alone were not sufficient for the temporary works design scope of works for such complex project. It was not possible for AIC to finalise the design of the temporary works without a workable calculation model (ETABS).	

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		temporary propping strategy at tender stage. The Experts do not agree on the feasibility of finalising the temporary works design without a workable calculation ETABS model.	Not agree with the side comment – AIC was entitled to rely on the ETABS model included in the tender pack for their temporary works design	Given AIC's responsibility for temporary works design, they were at liberty to either use the information provided, or develop their own analysis model to interrogate the temporary works condition in accordance with their own preferred construction sequencing.
4.4	TT were engaged by SPML to perform the temporary works design and construction sequencing in October 2018	Agreed	N/A	N/A
4.5	AIC were working collaboratively with TT post October 2018 and had the opportunity to review and influence both the construction sequencing and the temporary works design.	Not agreed	The scope of collaboration between AIC and TT is unknown.	In my report, I have stated that SPML sought input from AIC regarding the review of TT's scope of works before the design service agreement was signed. Additionally, there is evidence that AIC provided input on the design of the temporary works to TT during weekly design meetings. It is my opinion that AIC had opportunities to contribute both before the award of the design services to TT and during the design period itself.
4.6	Is it normal or standard in the industry for a steel contractor to bid on a project even if the temporary works have not been designed,	Agreed – in part	It is common that the permanent works engineer provides only concept or schematic (not fully detailed) design for the temporary works, as it is standard practice the	

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	provided that it had control of the temporary works?		contractor develops their own solutions for the erection of the structure along with the design of the required temporary elements. It is the main designer responsibility to provide the contractor with all consistent and clear design inputs, information, reports and workable models so they can proceed with their own design for the temporary works.	At the time of tender, AIC were provided with " <i>all design inputs, information, reports and models</i> "
4.7	Was the design of the temporary works removed from AIC?	Not agreed	Yes, the temporary works design was removed from AIC's scope of works. Refer to email "SJMB structural engineering proposal" dated 03 Oct. 2018	This is a contractual issue.
4.8	Is it normal or standard in the industry for a steel contractor to provide a lump sum bid for a project where the temporary works are to be designed by a third party during construction?	Not agreed	No, it is not normal. Lump sum bids are not typically used for pricing undefined or unknown items, in particular if there is no direct control of the final cost, as happened in SABIC project after the design of temporary works was removed from AIC's scope of works. It would be normal for a steel contractor to first define a strategy for the temporary works and then consider and study the most economical and efficient solutions, to be competitive at bidding stage.	At the time of tendering, there was no "third party" – the contractor (and their subcontractor) had full responsibility for the temporary works design and made their own assessment of the work involved.
4.9	Is the structural optimisation of the TT design of the propping tower	Not agreed	Yes, the temporary tower and props contained in the report AIC-016-FE-	The question is hypothetical and therefore moot. The Maffei report

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	and props, contained in report AIC-016-FE-RP003_REV00 and performed by Maffeis technically sound and suitable for construction?		RP003_REV00 have been optimised, calculated, and verified according to the structural codes, for the design loads extracted from the working ETABS models. They are suitable for constructions & installation and consider the material availability on the market and all typical site conditions, including craneage, lifting accessibility and installation methods.	recommendations have never been tested as being suitable for the site conditions and availability of materials at the time of construction. In addition, they have not been reviewed by SABIC or their design consultants for acceptability.


Declaration and Statement of Truth

1.1.14 Both Mr Riccardo Magarotto and Mr Ian Burns declare that:

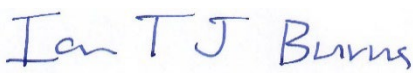
- a) We understand that it is our duty in giving evidence in this arbitration is to assist the arbitral tribunal to decide the issues in respect of which expert evidence is adduced. We have complied with, and will continue to comply with, that duty.
- b) We confirm that this is our own, impartial, objective, unbiased opinions, which have not been influenced by the pressures of the dispute resolution process or by any party to the arbitration.
- c) We confirm that all matters upon which we have expressed an opinion, are within our area of expertise.
- d) We confirm that we have referred to all matters which we regard as relevant to the opinions we have expressed and have drawn to the attention of the arbitral tribunal all matters, of which we are aware, which might adversely affect our opinion.
- e) We confirm that, at the time of providing this written joint statement, we consider it to be complete and accurate and constitute our true, professional opinions.
- f) We confirm that if, subsequently, we consider our opinions to require any correction, modification or qualification, we will notify the parties to this arbitration and the arbitral tribunal forthwith.

Date: 20 November 2024

Signatures:


Signature

Mr Riccardo Magarotto


Signature

Mr Ian Burns

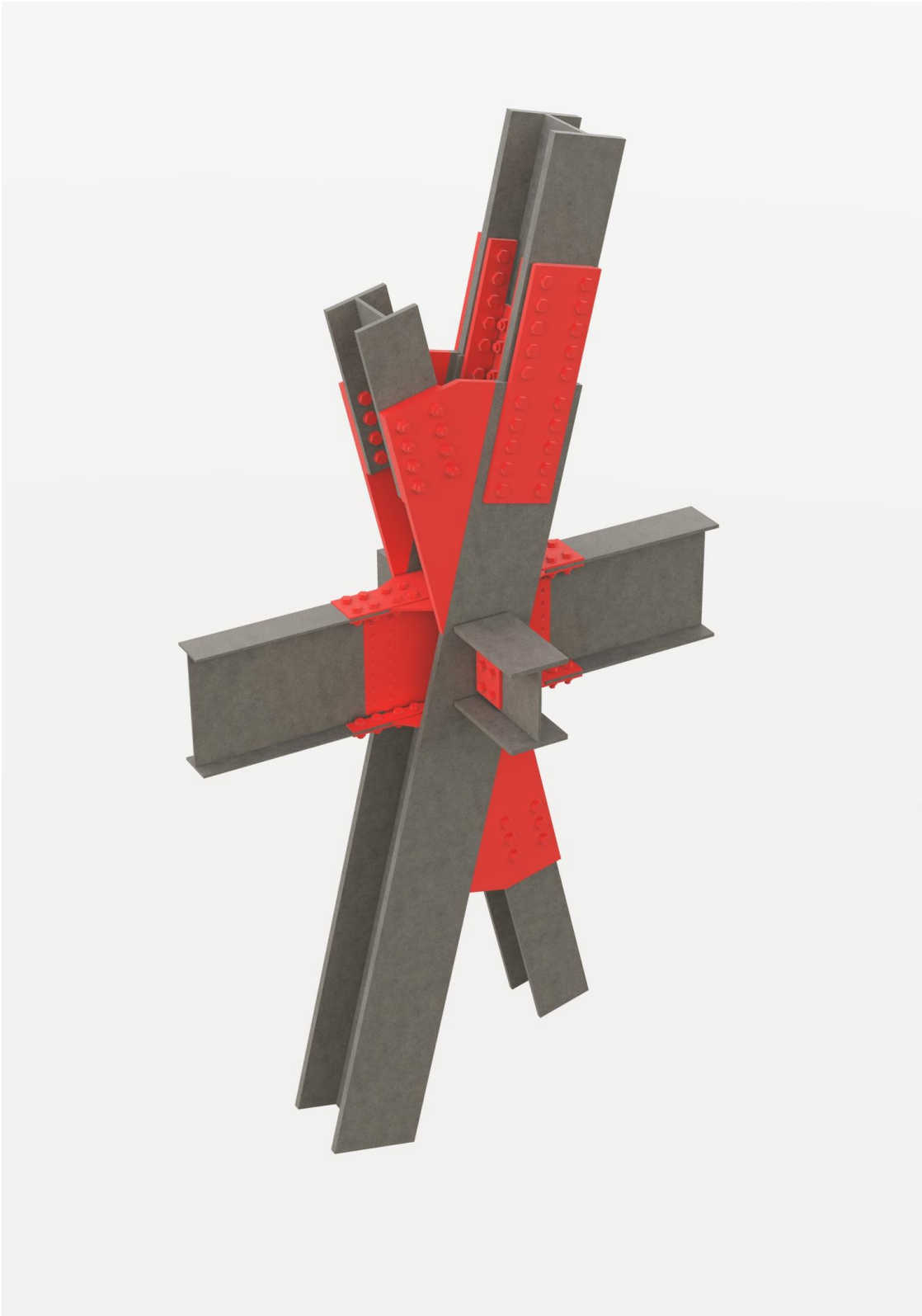
ARABIAN INTERNATIONAL COMPANY FOR STEEL STRUCTURE
Claimant

-and-

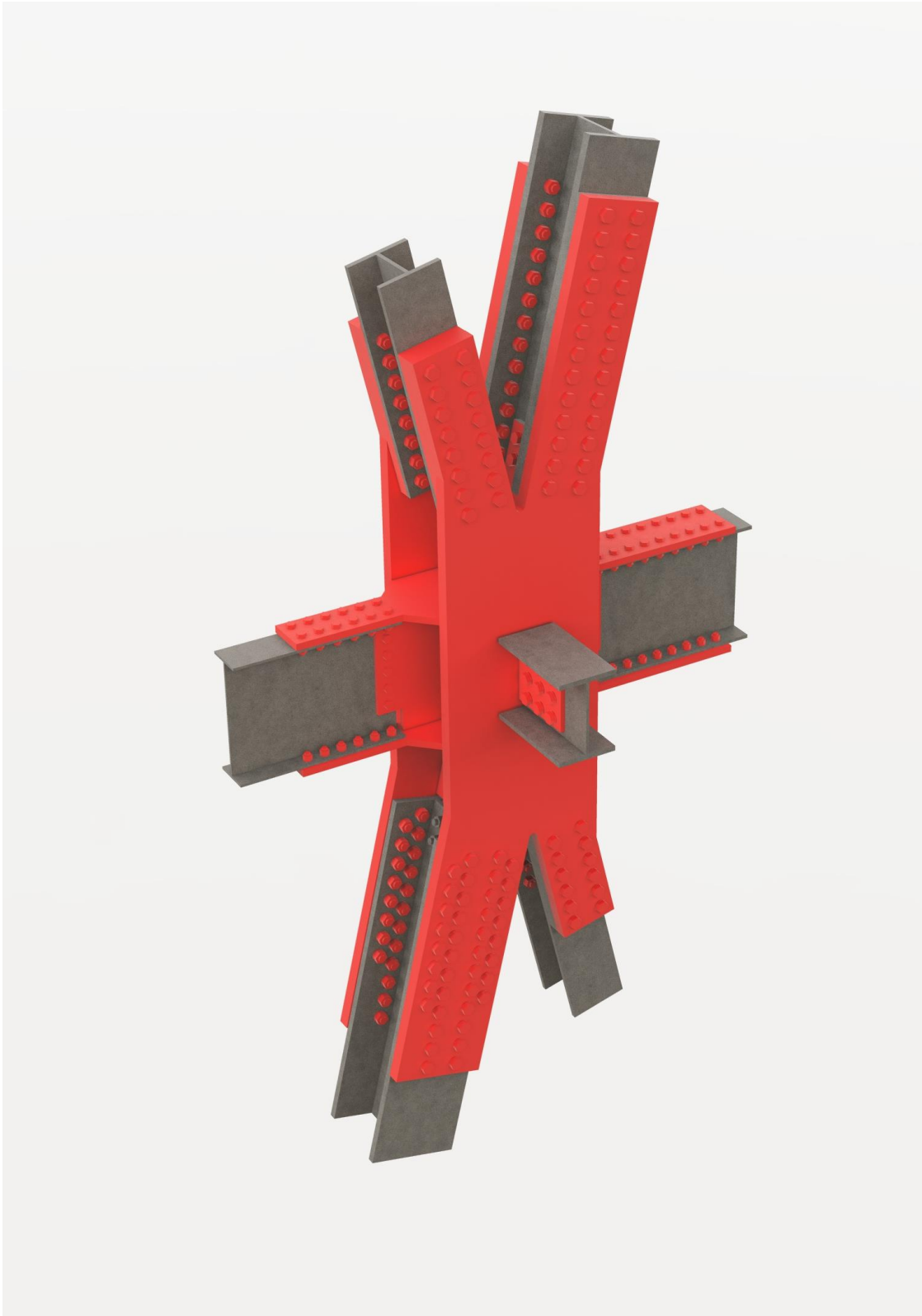
SHAPPORJI PALLONJI MIDEAST LLC
Respondent

EXPERT JOINT STATEMENT – EXHIBIT A

Reference to Table 1, items 2.4 - 2.7 - 3.28



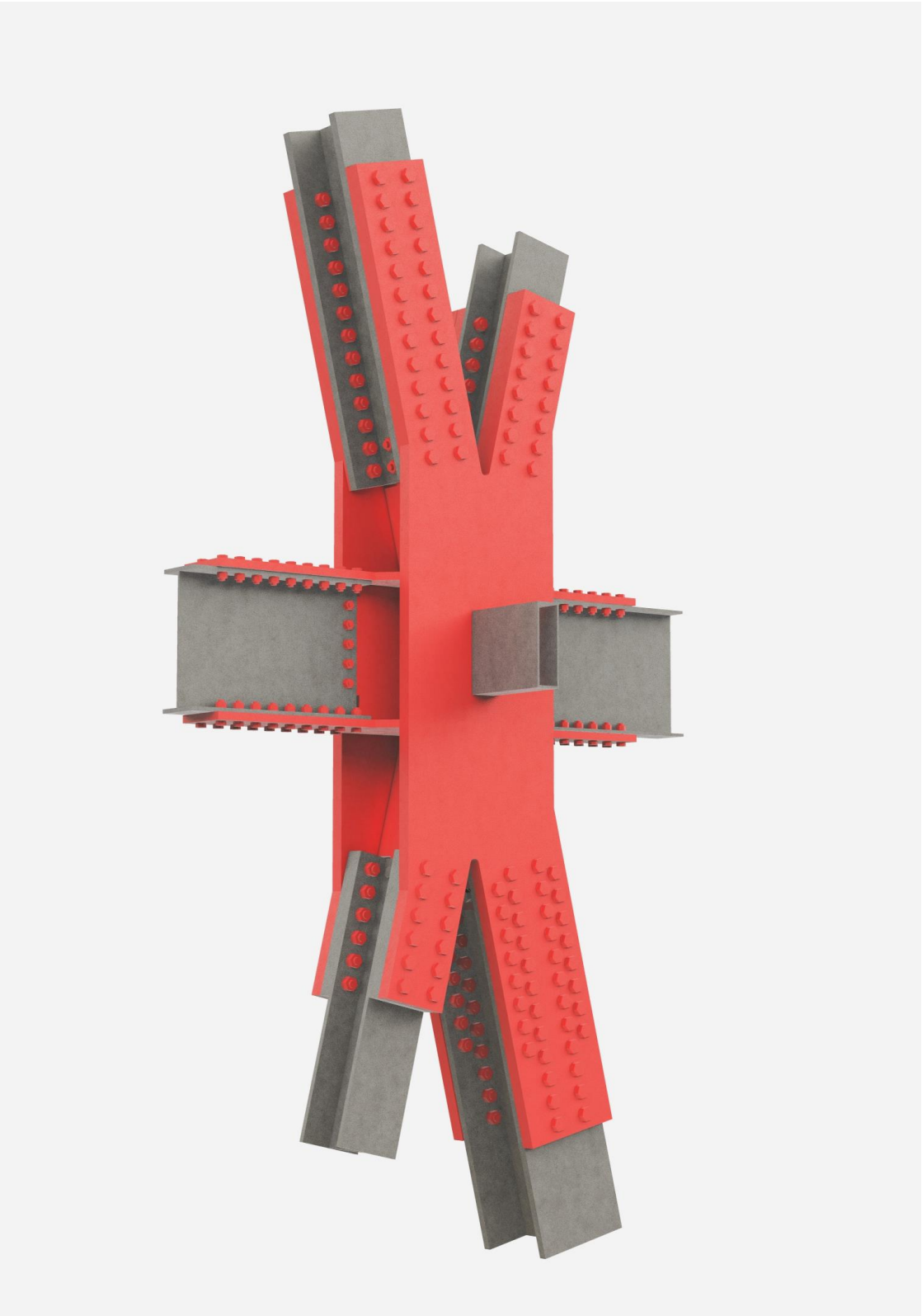
MAFFEIS SOLUTION



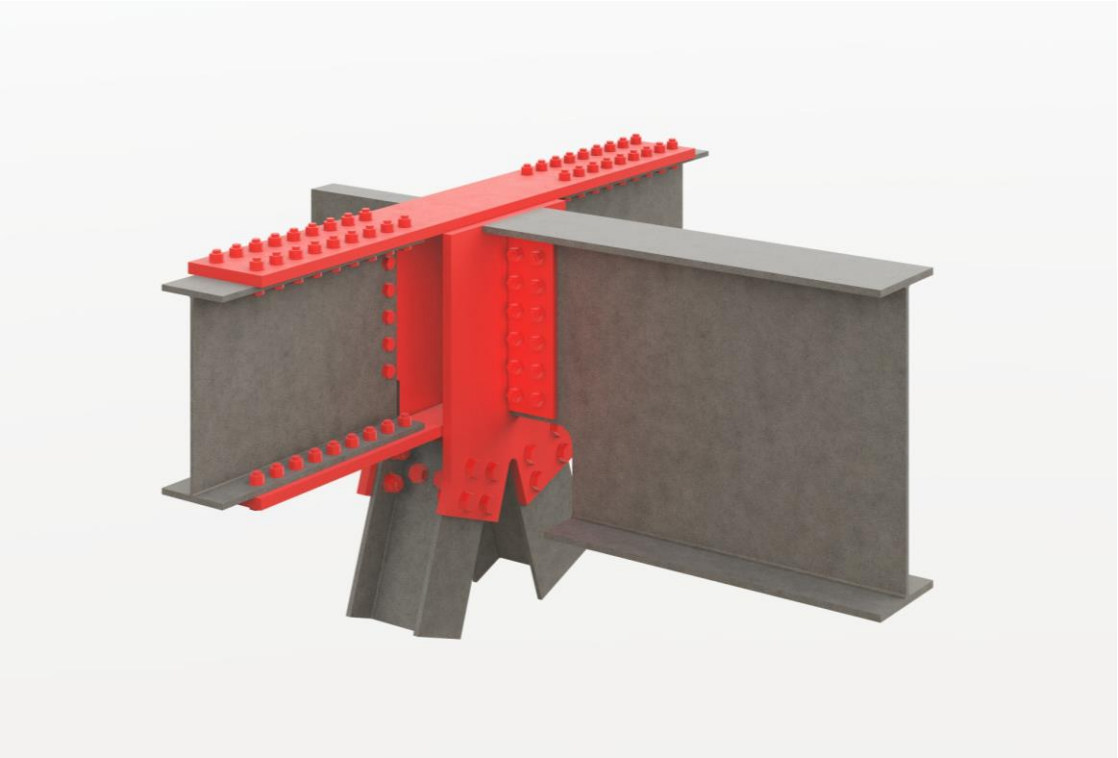
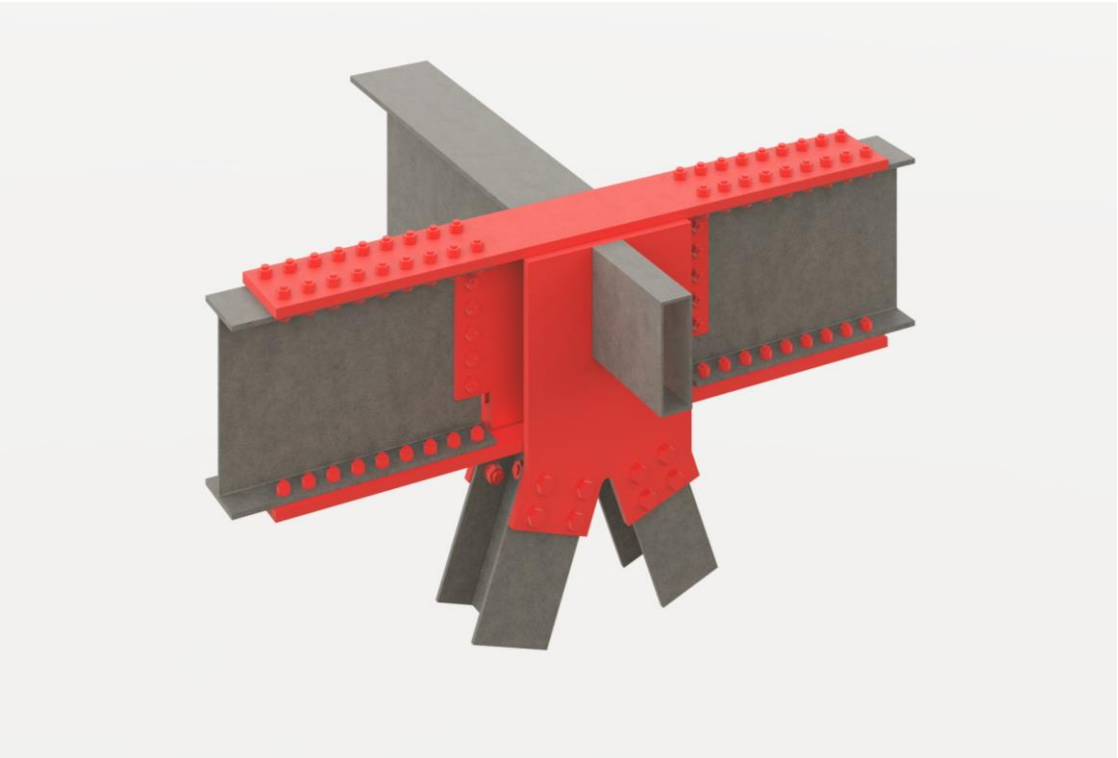
TT SOLUTION



MAFFEIS SOLUTION



TT SOLUTION



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