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ASFE 'Prague 2011

A Structural Fire Engineering Prediction for the Veselí Fire Tests, 2011

Shan-Shan Huang, Ian Burgess & Buick Davison

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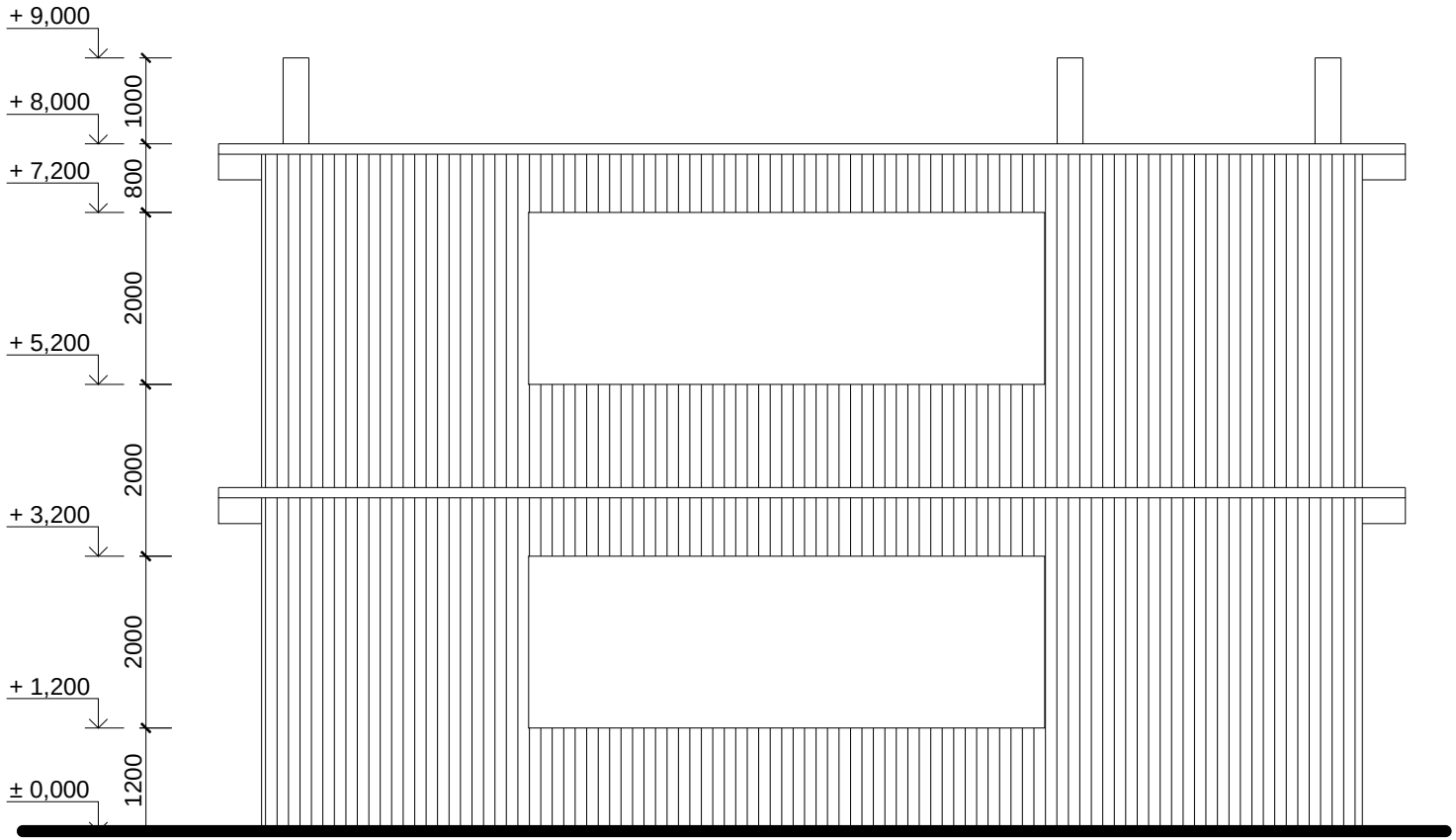
COMPFIRE Demonstration Tests in Veselí



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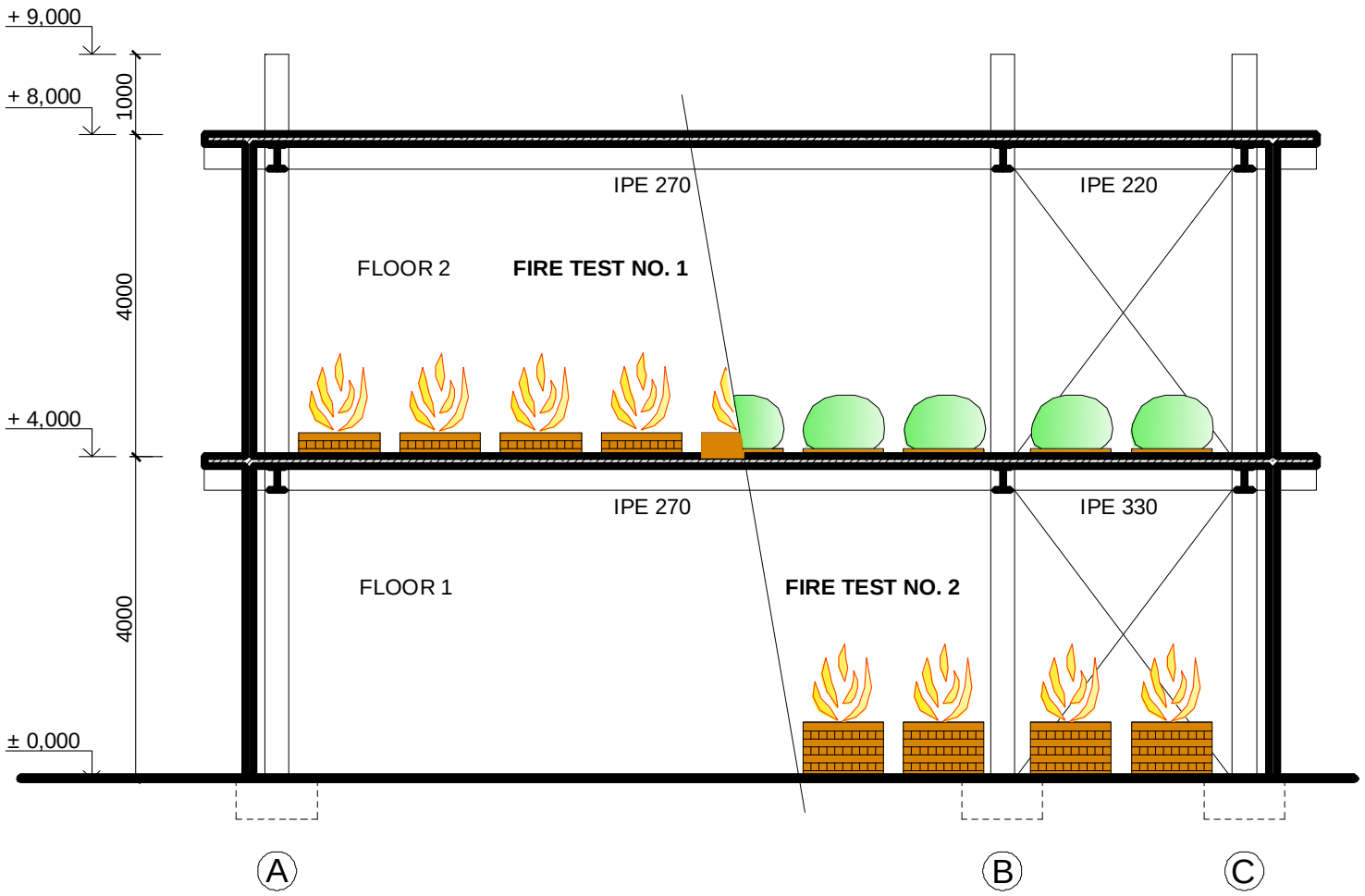
Test Arrangement



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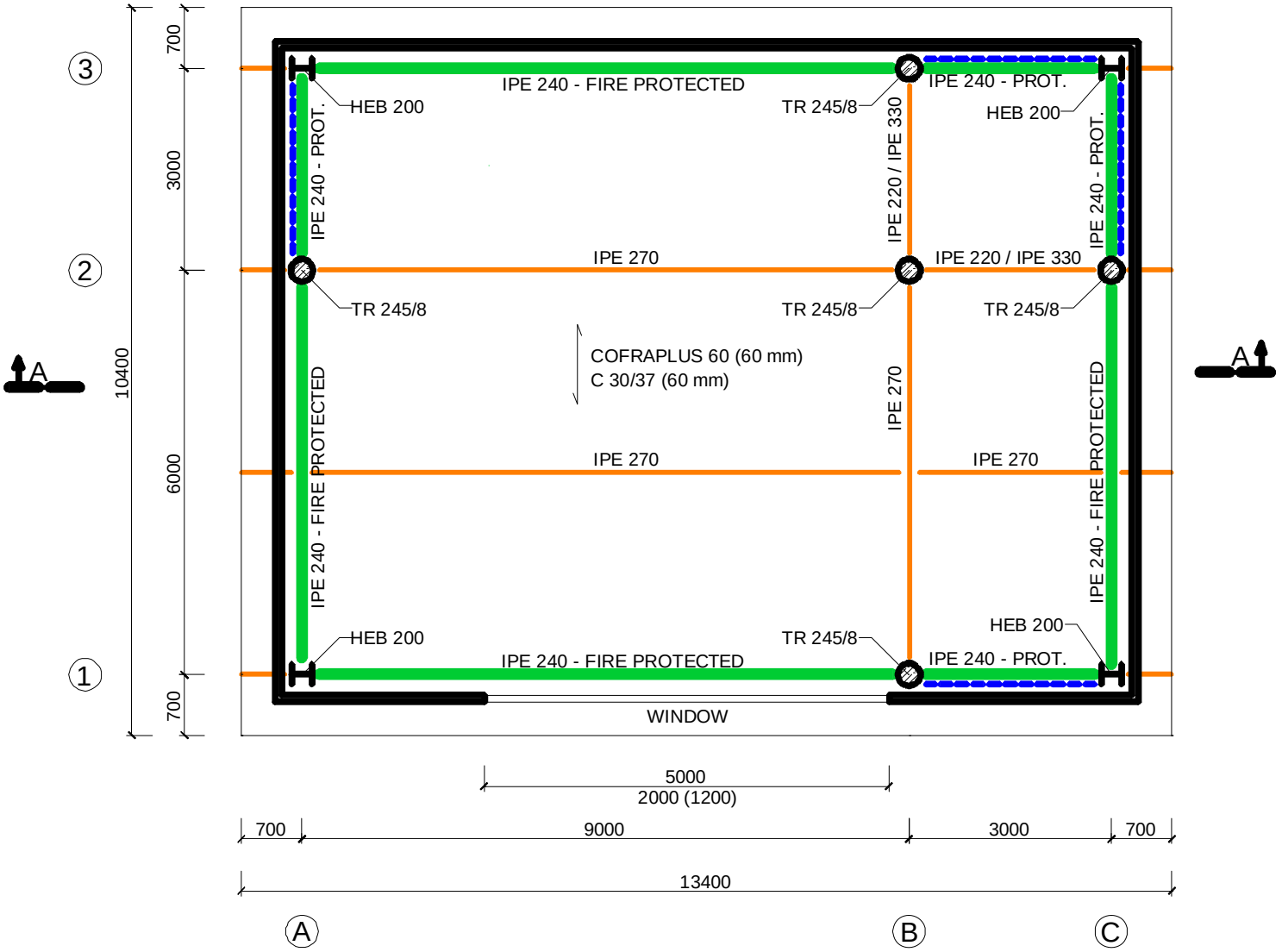
Floor Plan



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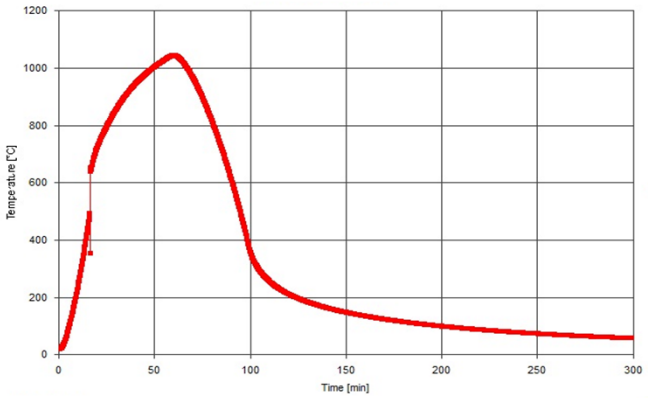
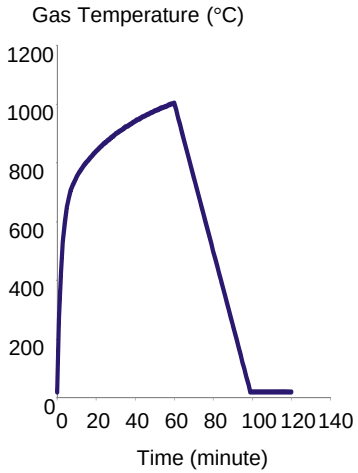
Vulcan Model



Gas temperature:
1046°C at 60 minutes



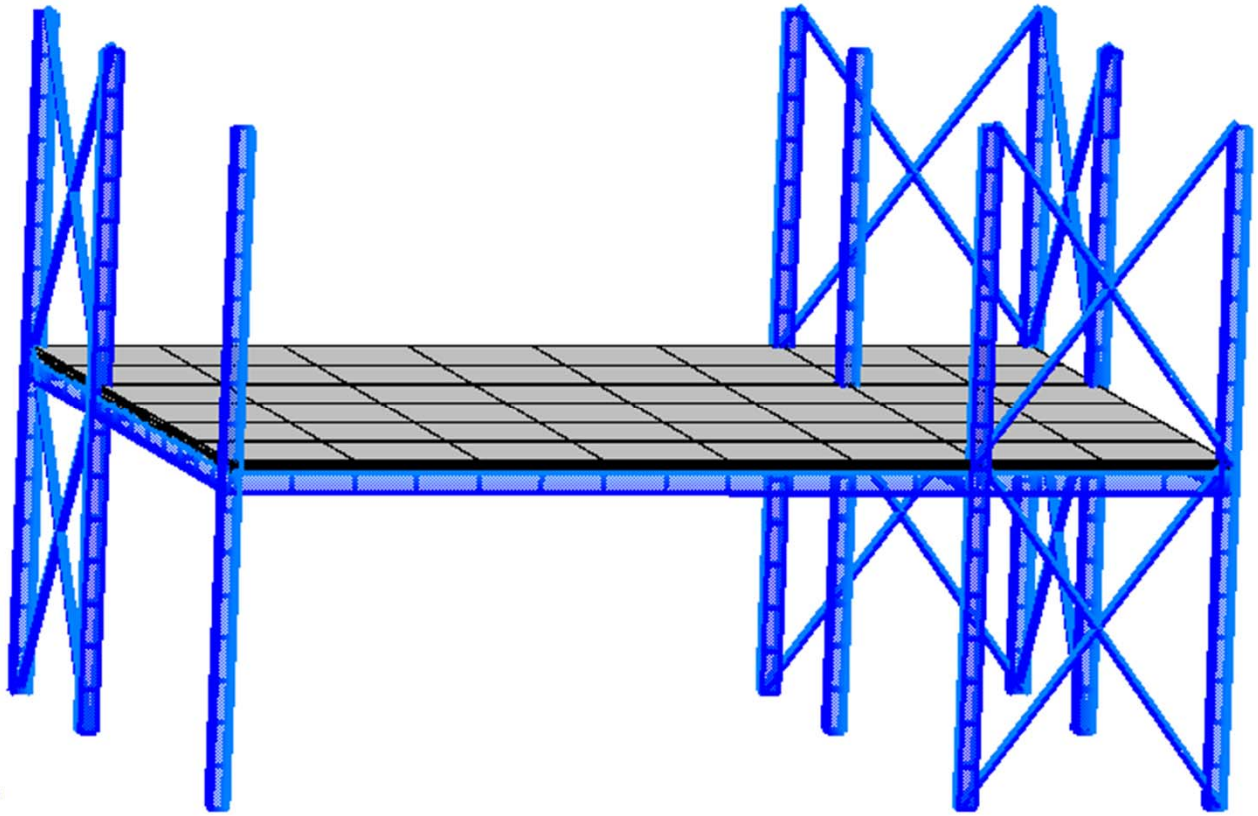
EC type of fire curve
applied to the model

Characteristic design loads

Dead load:	Slab	2.35 kN/m^2
	Flooring	0.5 kN/m^2
Live load:	Payload	3.0 kN/m^2
	Partitions	0.5 kN/m^2

Applied load on slab to the model: 6.35 kN/m^2

Point loads on columns: 2.85 kN/m^2



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Assumptions made in the *Vulcan* Model

- Circular CFT columns modelled as equivalent square CFTs;
- Connections represented by rotational spring elements;
- Varying the rotational stiffnesses of the springs to model rigid, semi-rigid and pinned connections;
- Composite slab with trapezoidal decking modelled as a flat slab with different bending stiffnesses in the two orthogonal directions.

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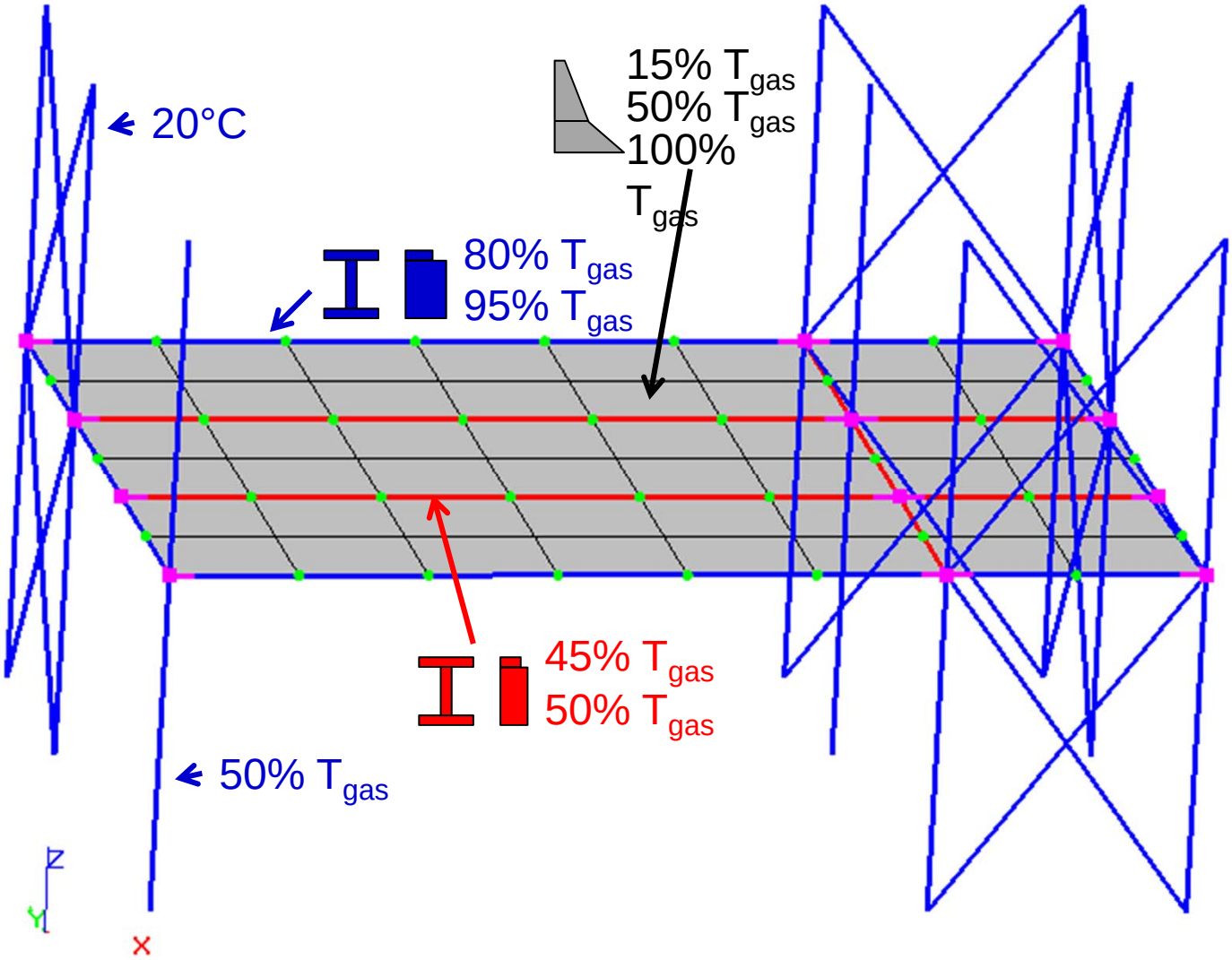
Temperature Distribution



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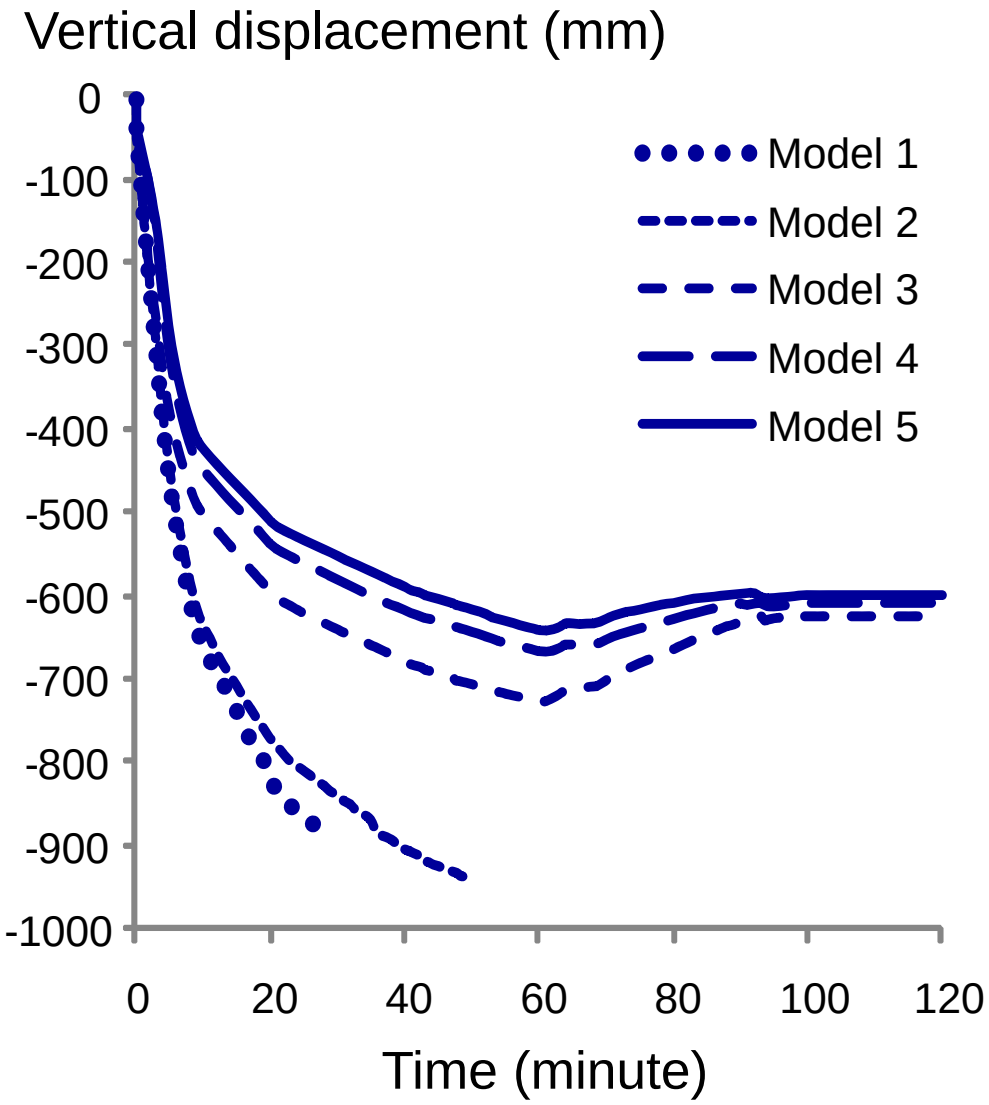
Vulcan Analysis Results

Model No.	Connection Rigidity	Rotational Spring Stiffness (Nmm/rad)
1	Pinned	100
2	Semi-rigid	$5x10^5$
3	Semi-rigid	$1x10^9$
4	Semi-rigid	$1x10^{10}$
5	Rigid	$1x10^{12}$



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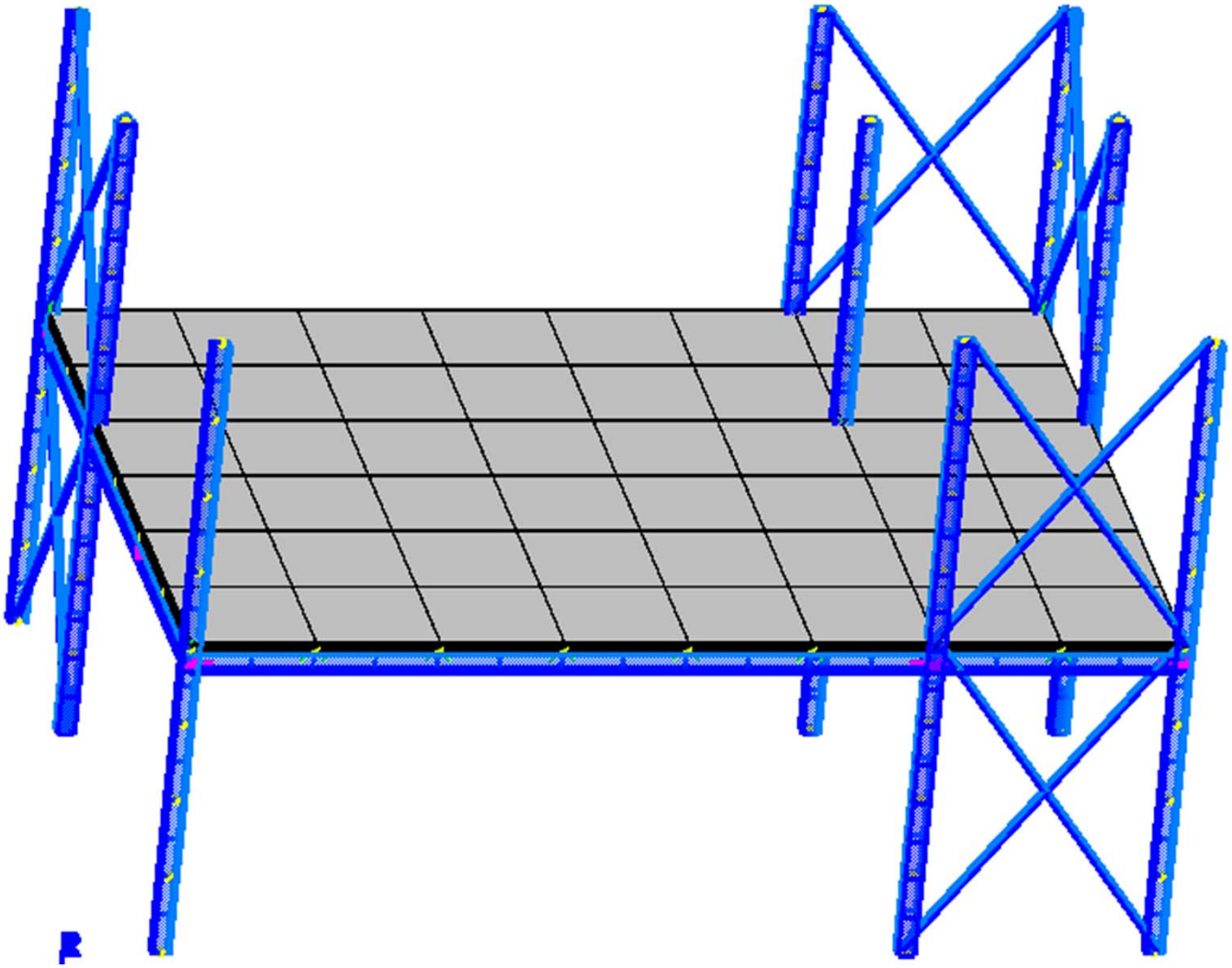
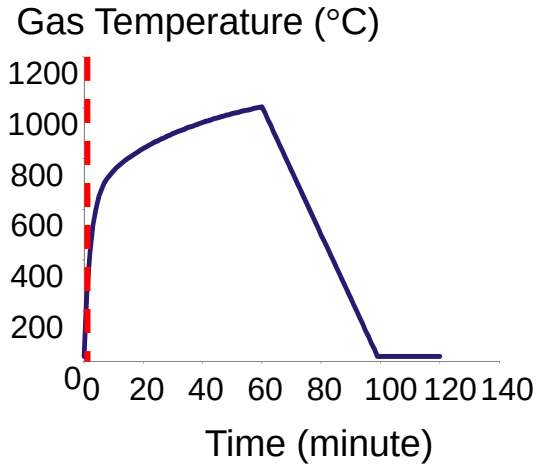
Deformation Shape





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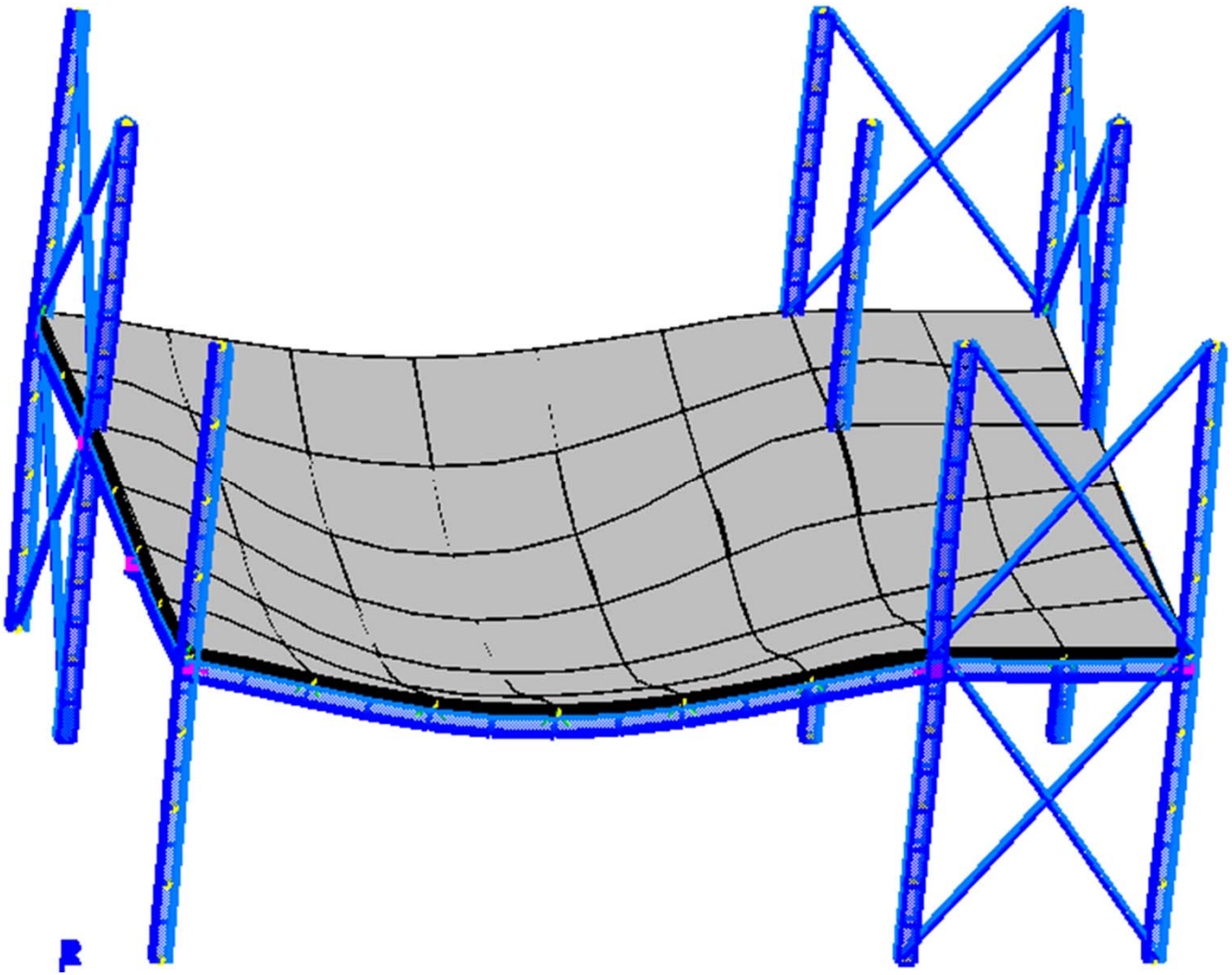

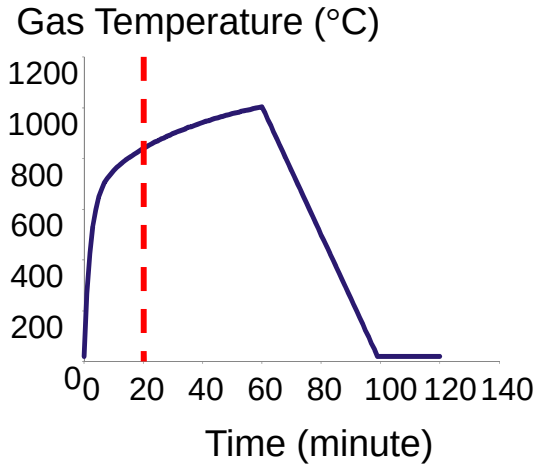

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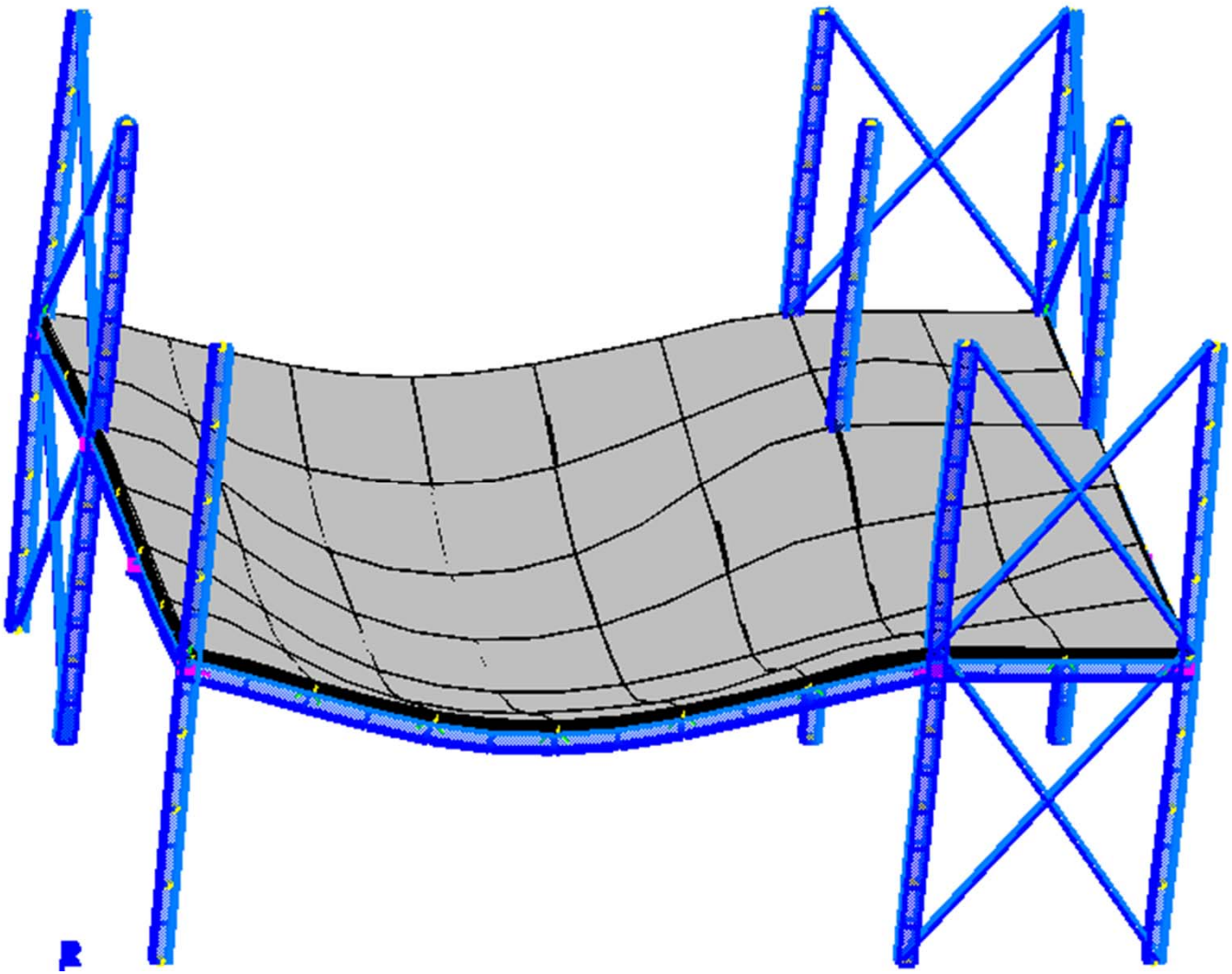

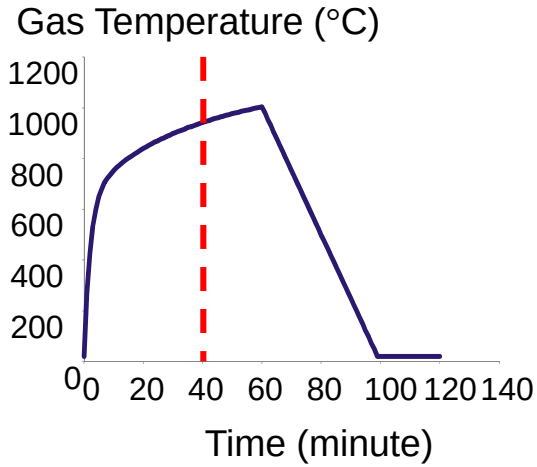

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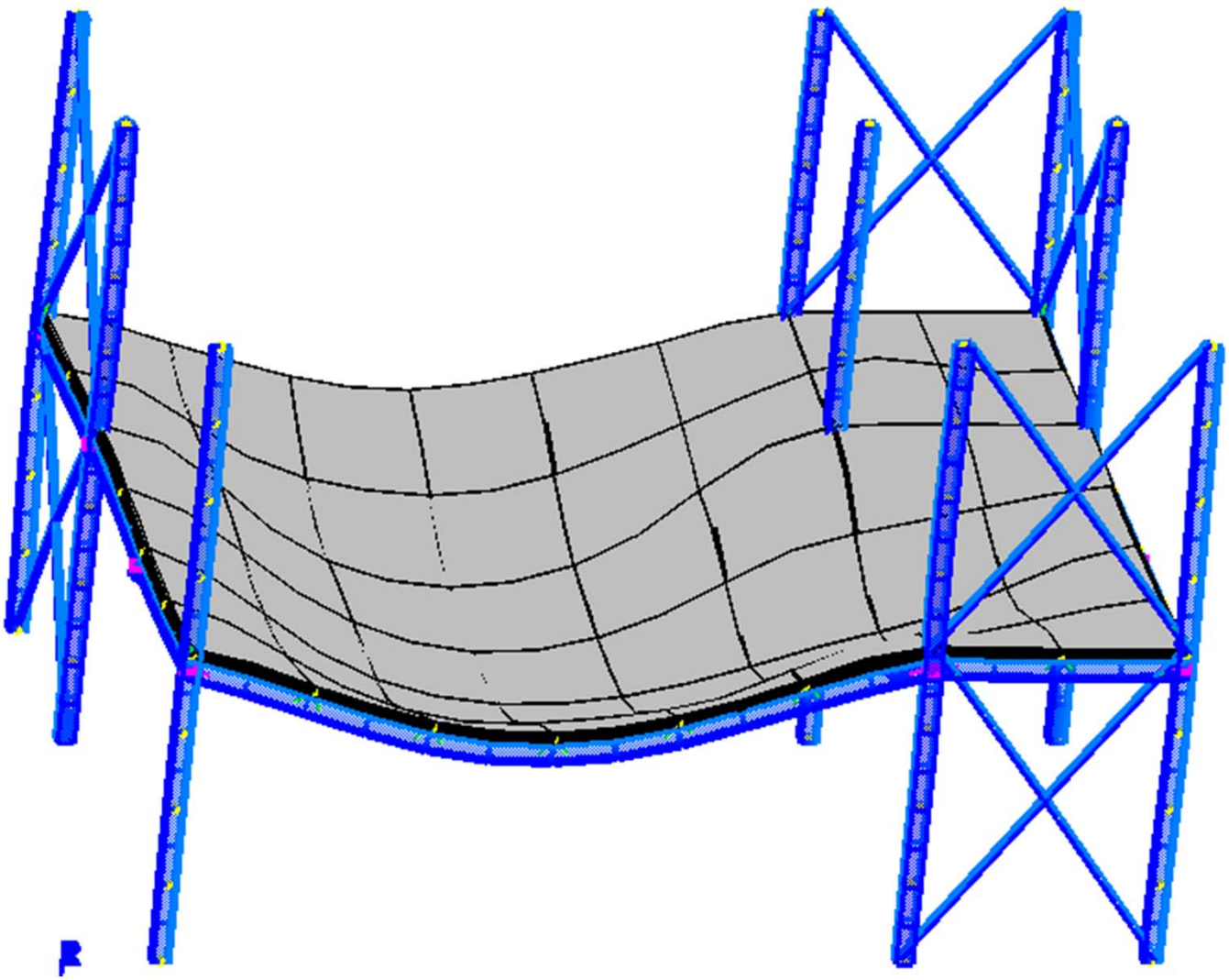

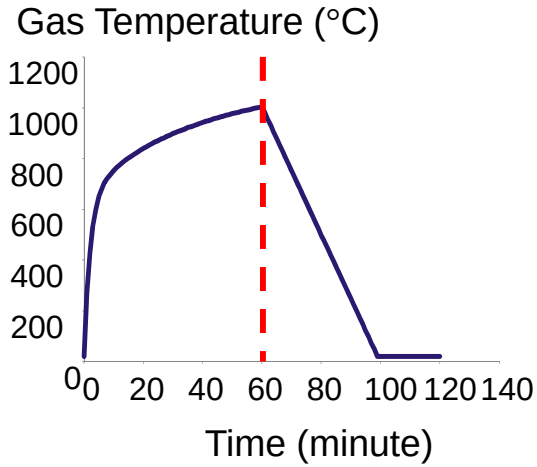

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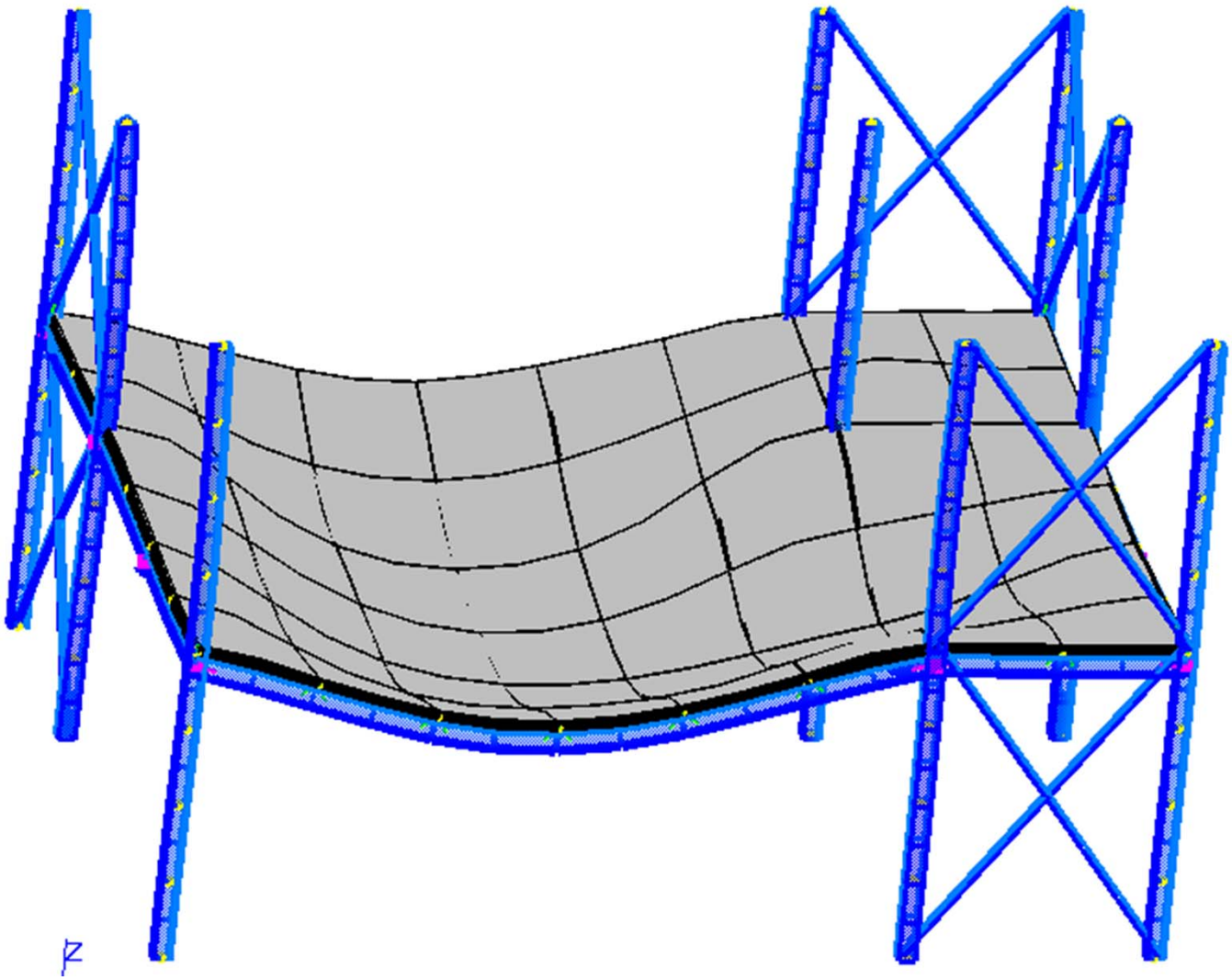

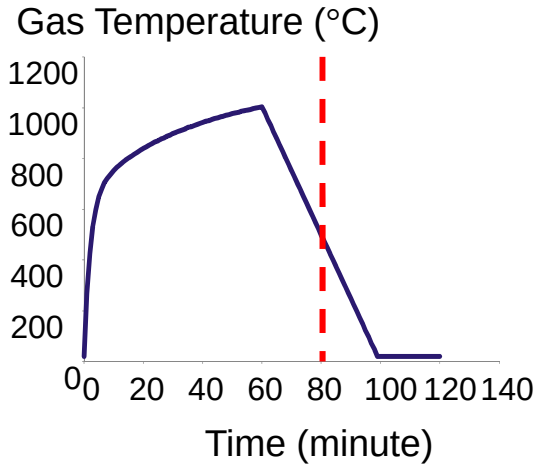

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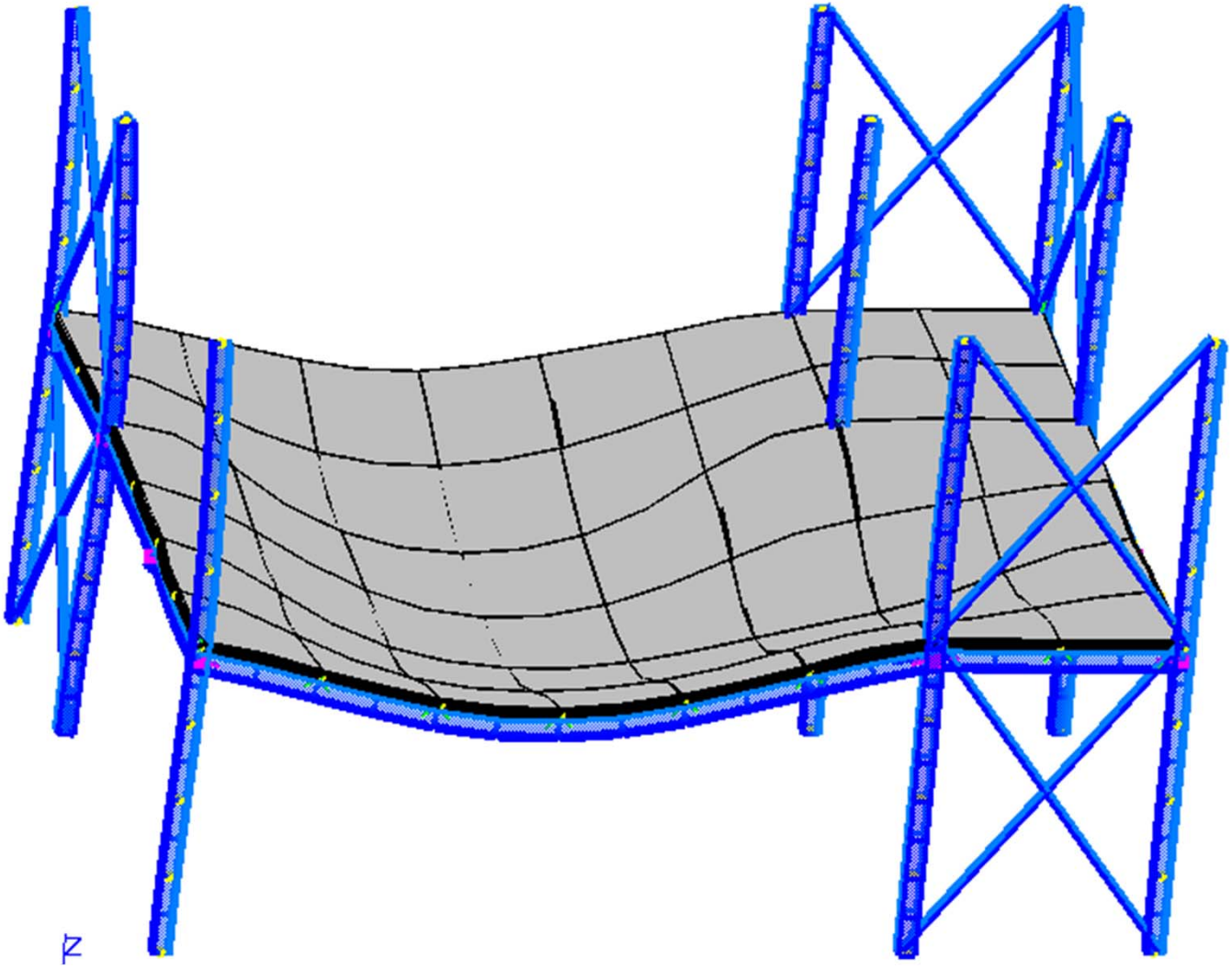

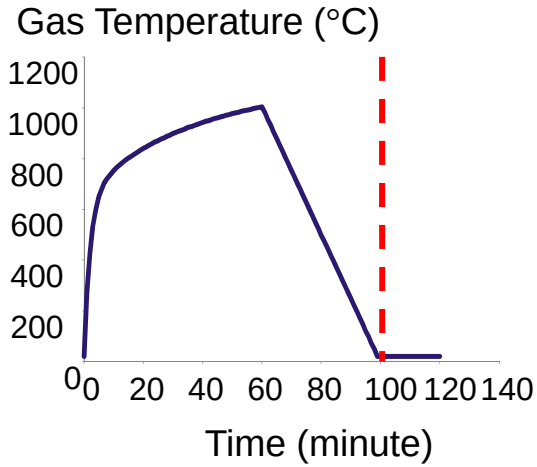

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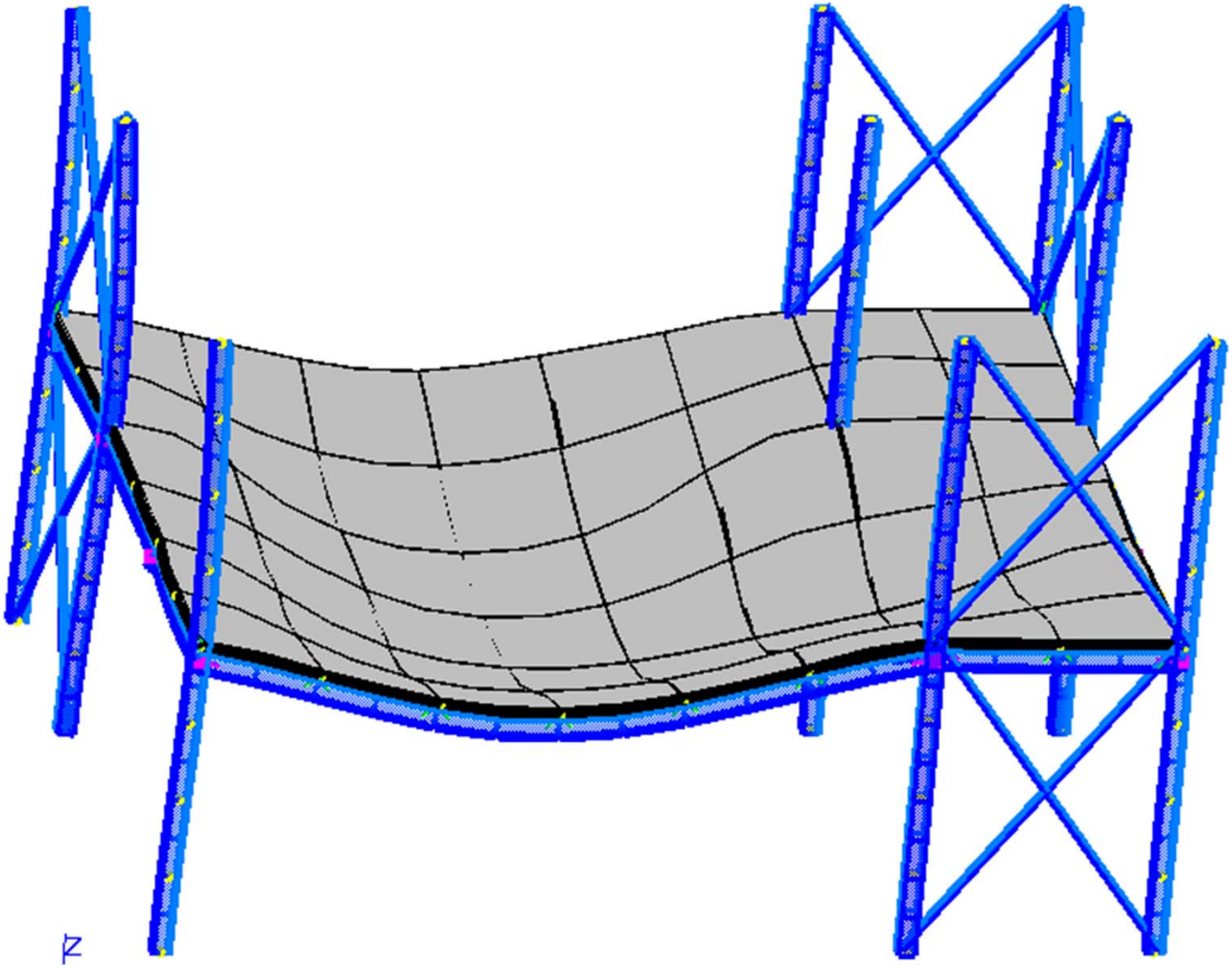

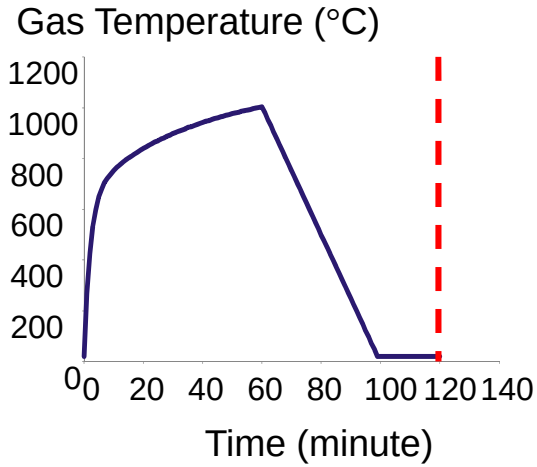

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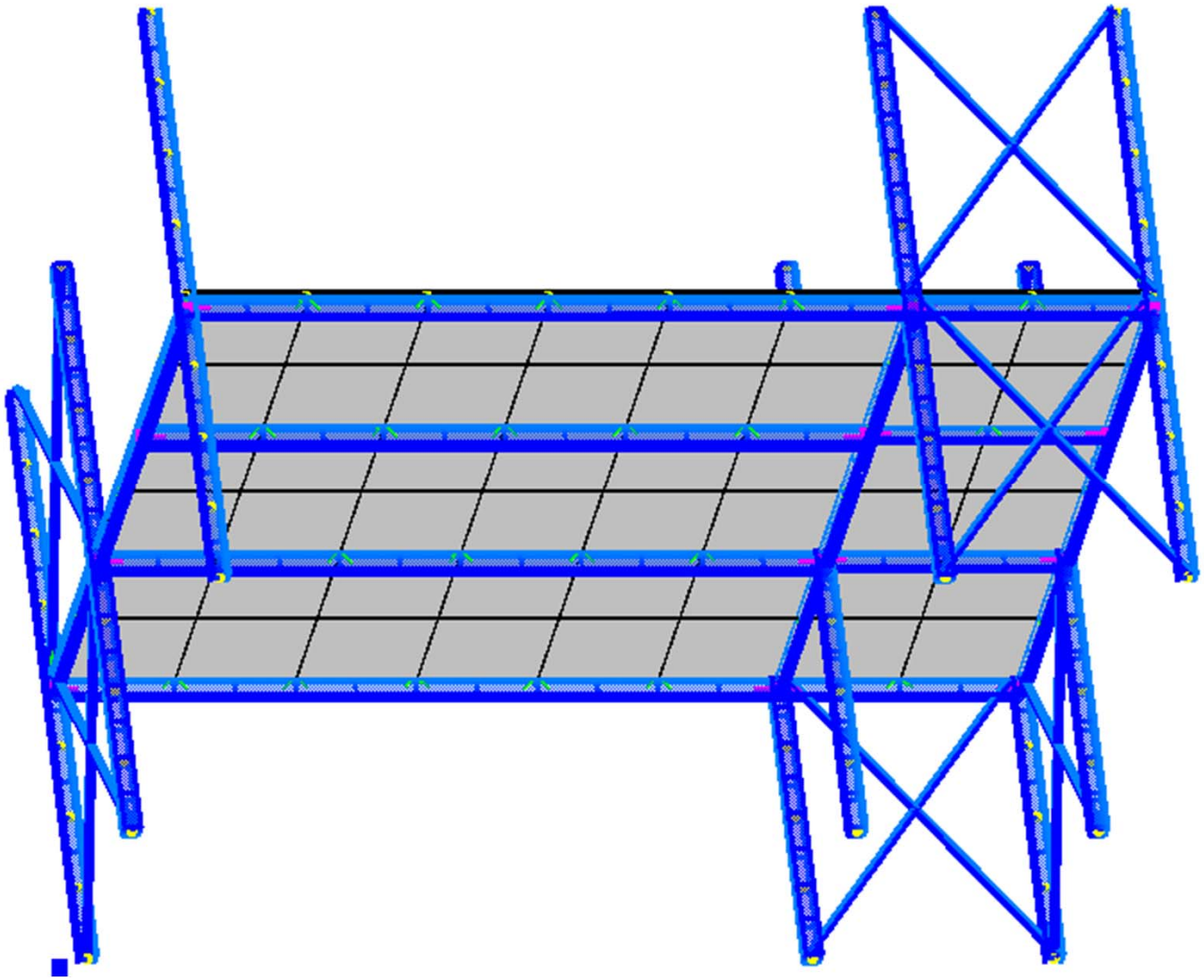

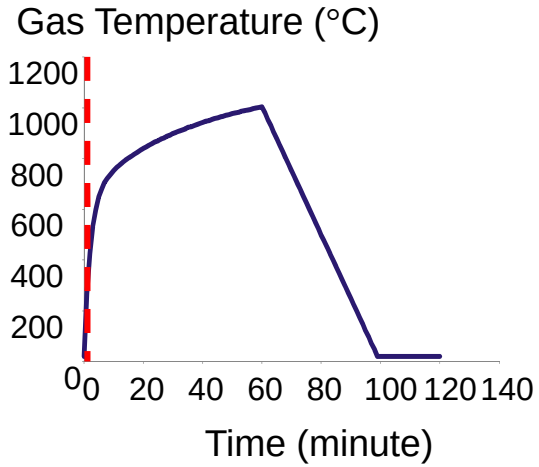

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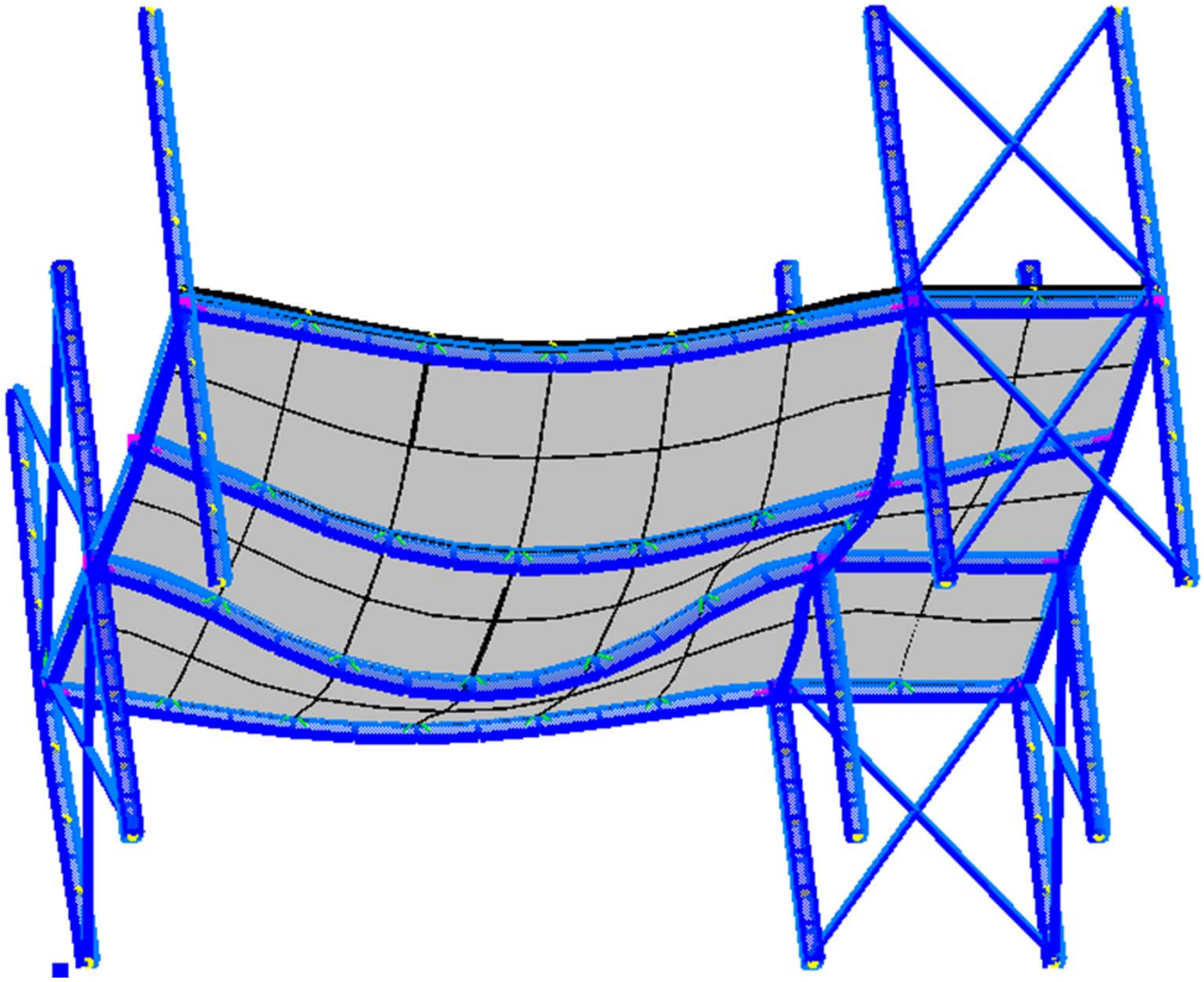
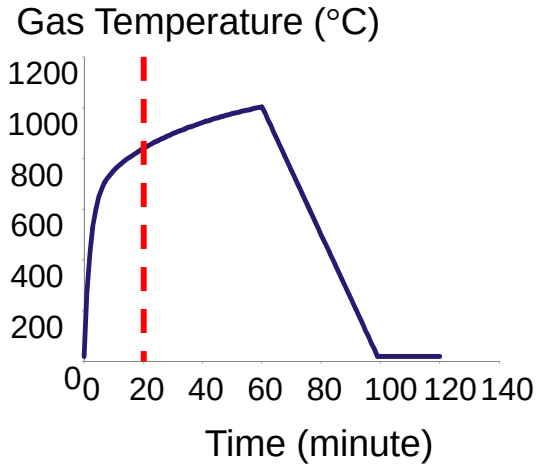
Deformation Shape





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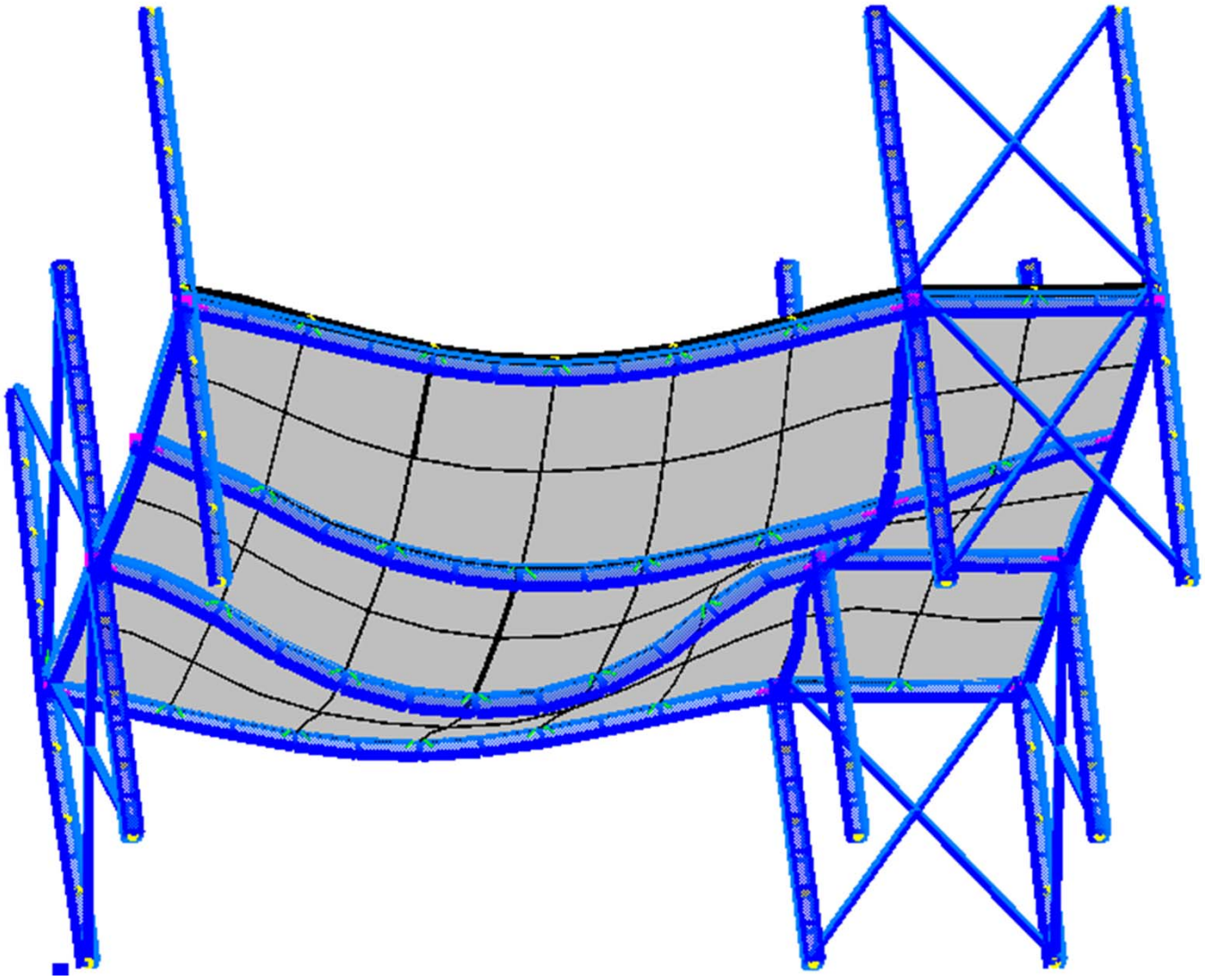

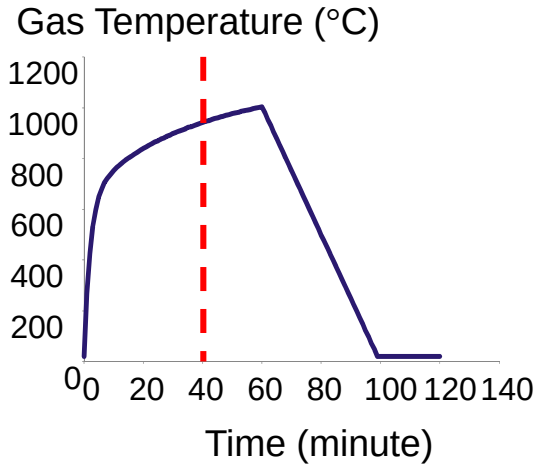

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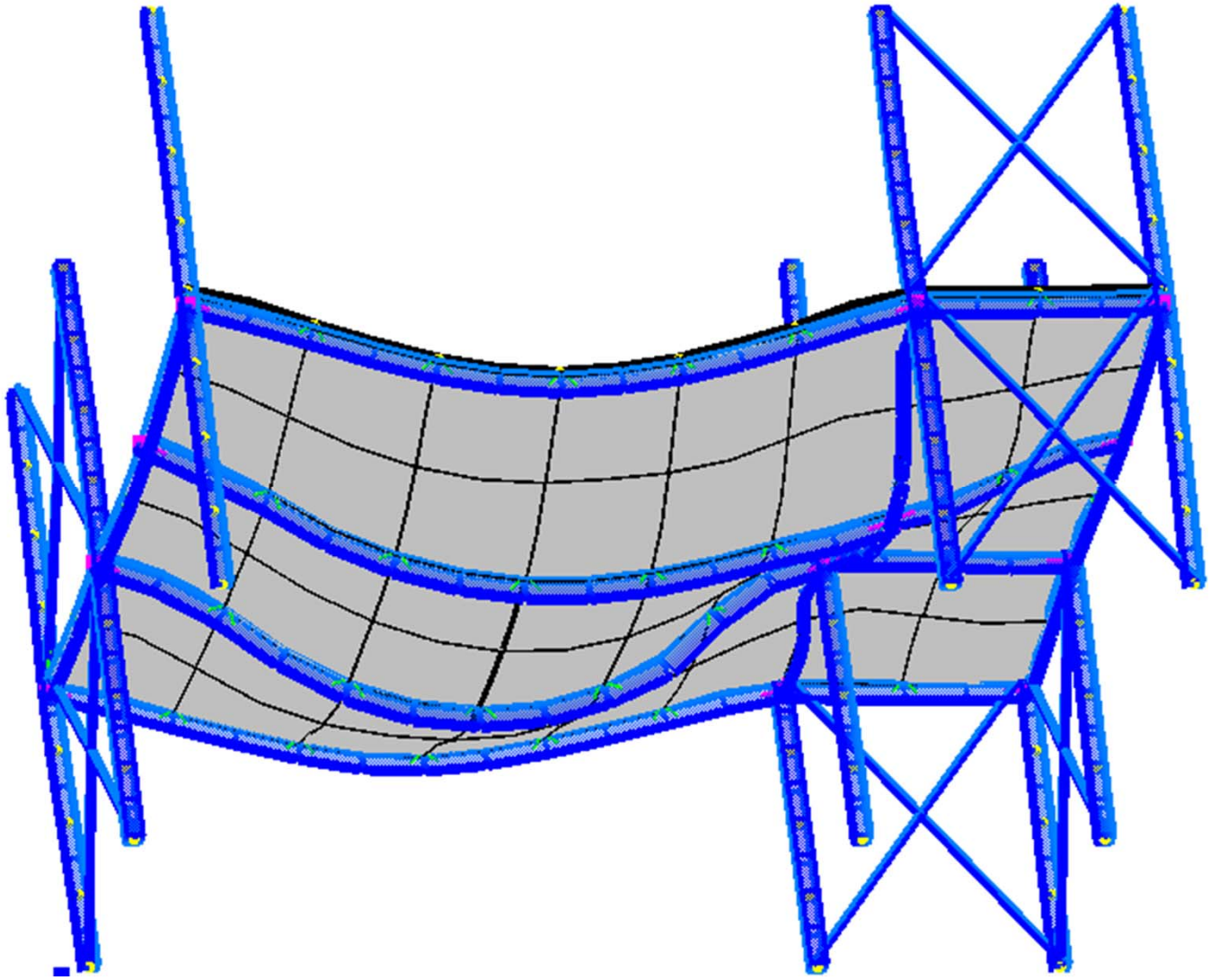

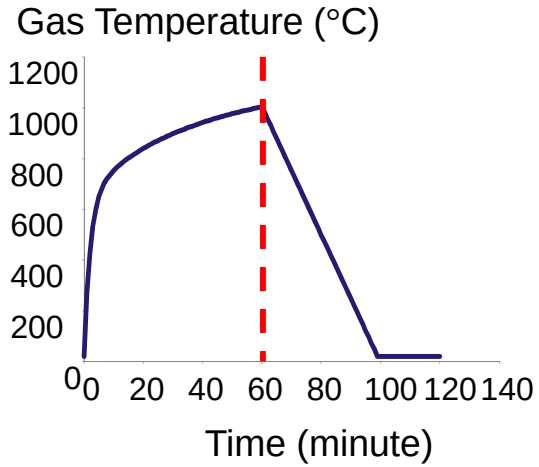

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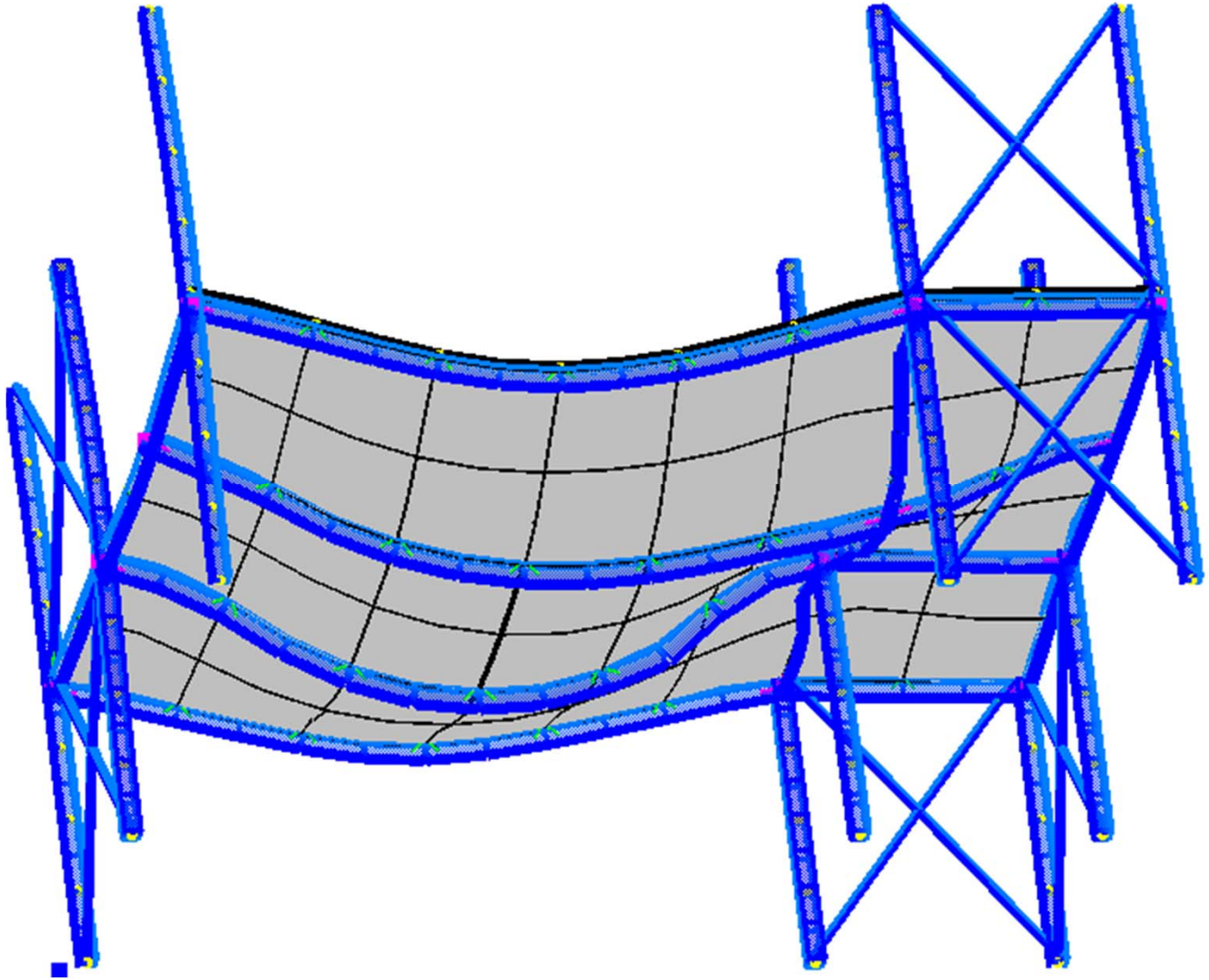

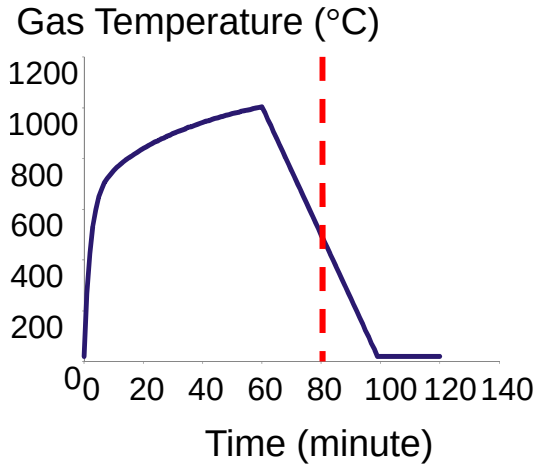

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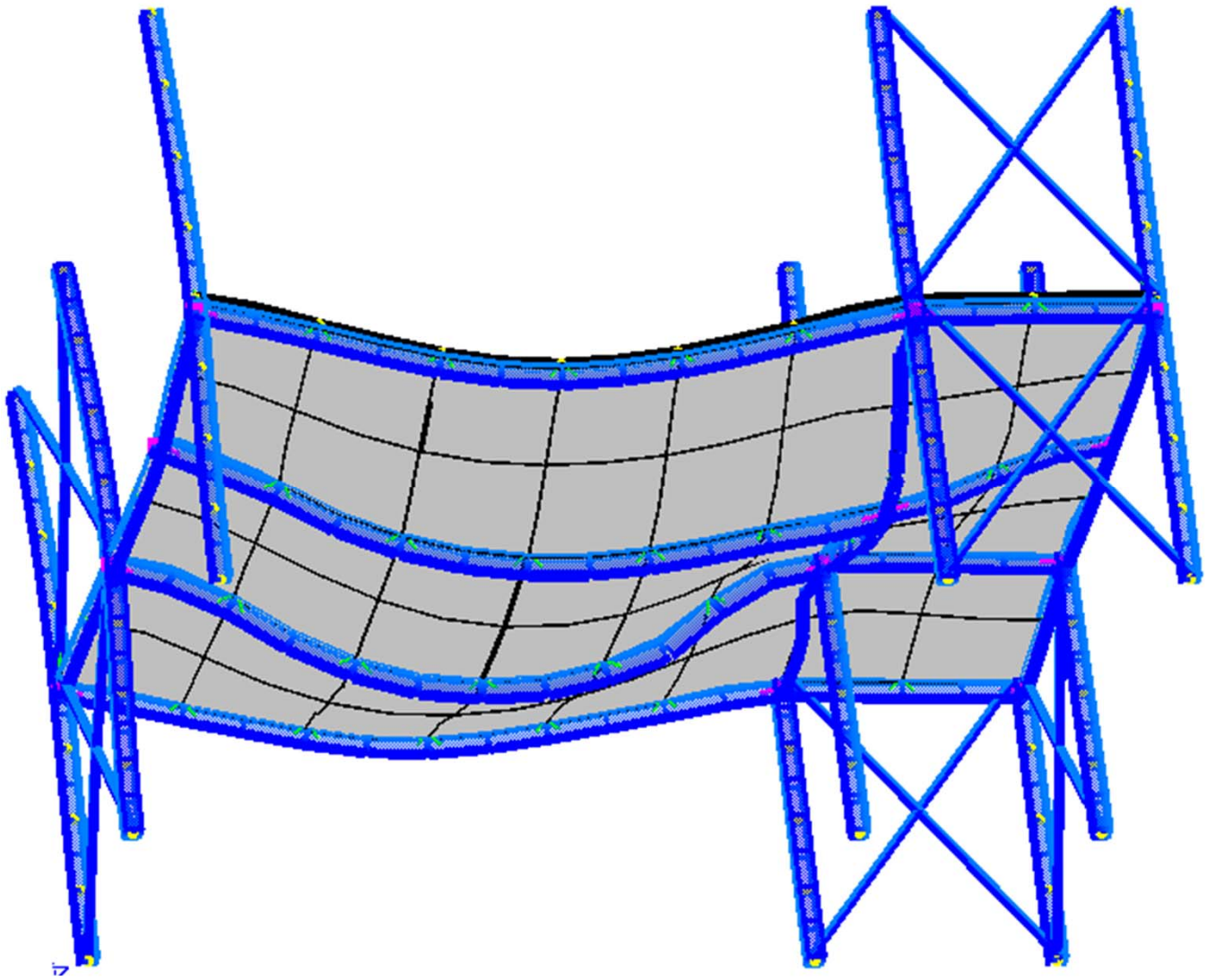

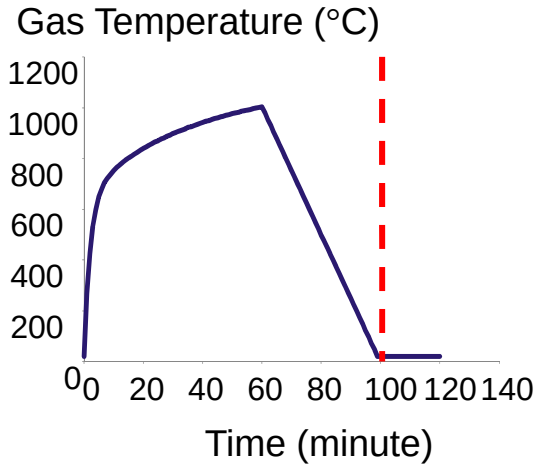

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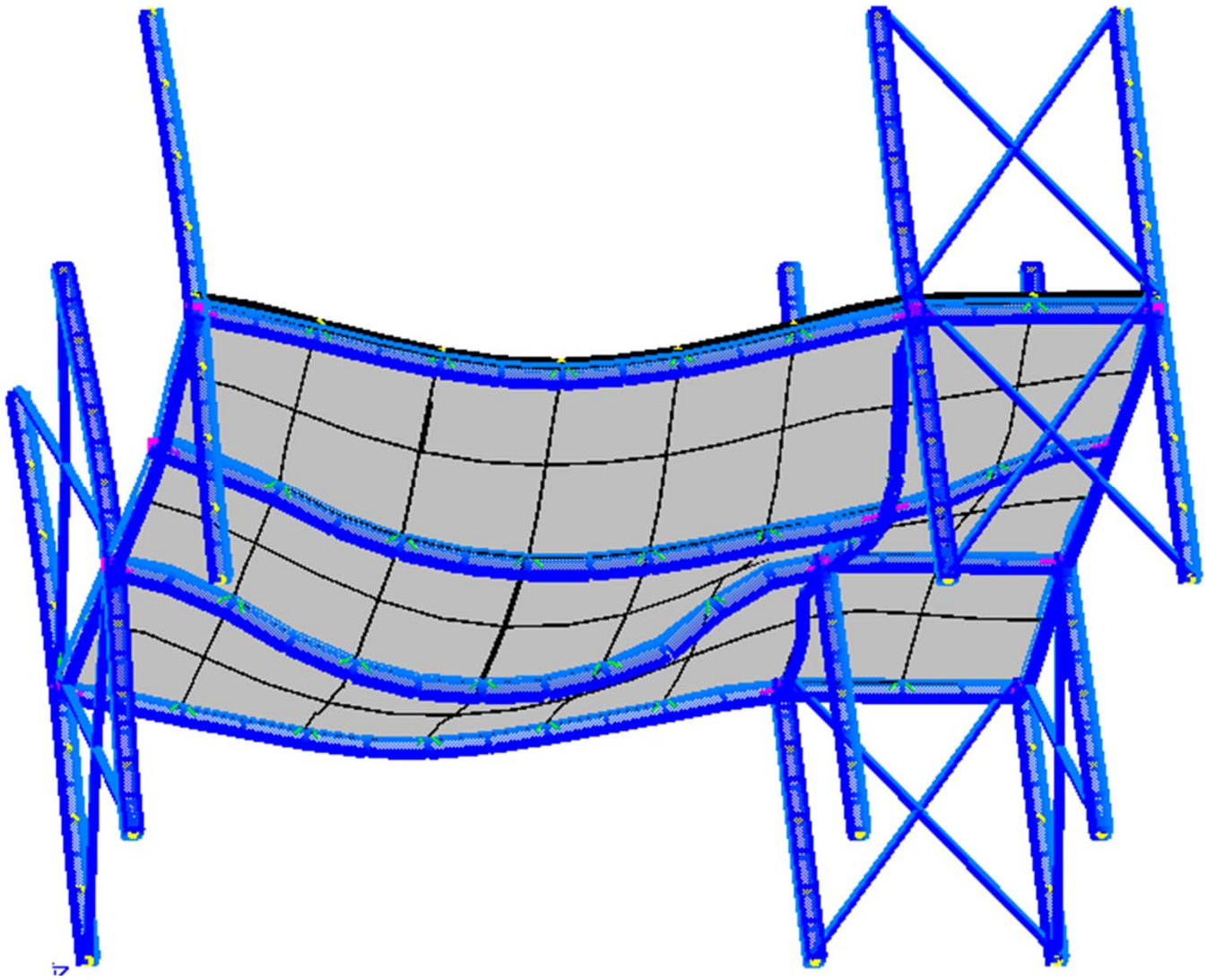

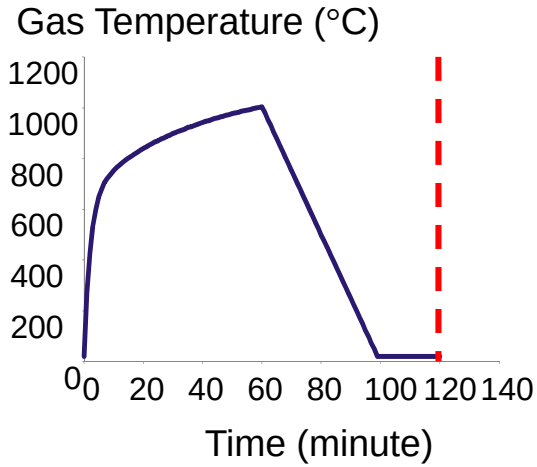

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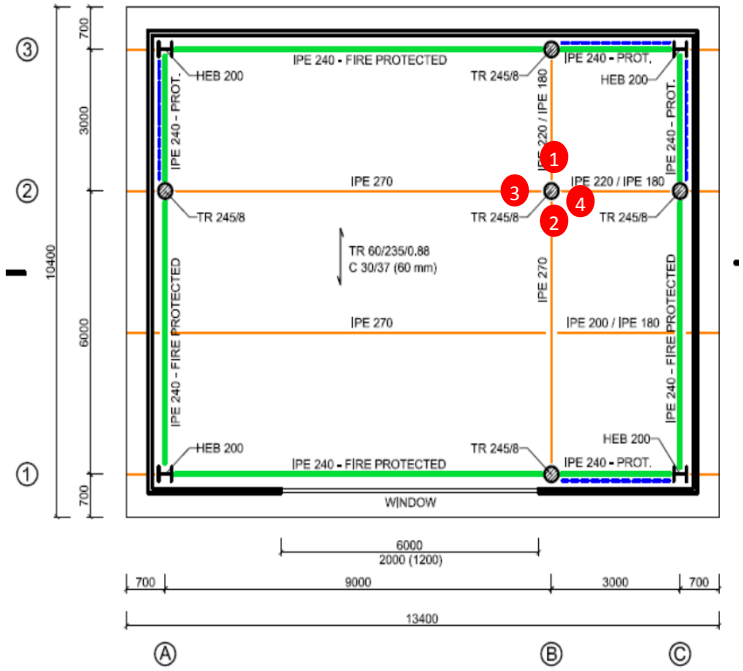
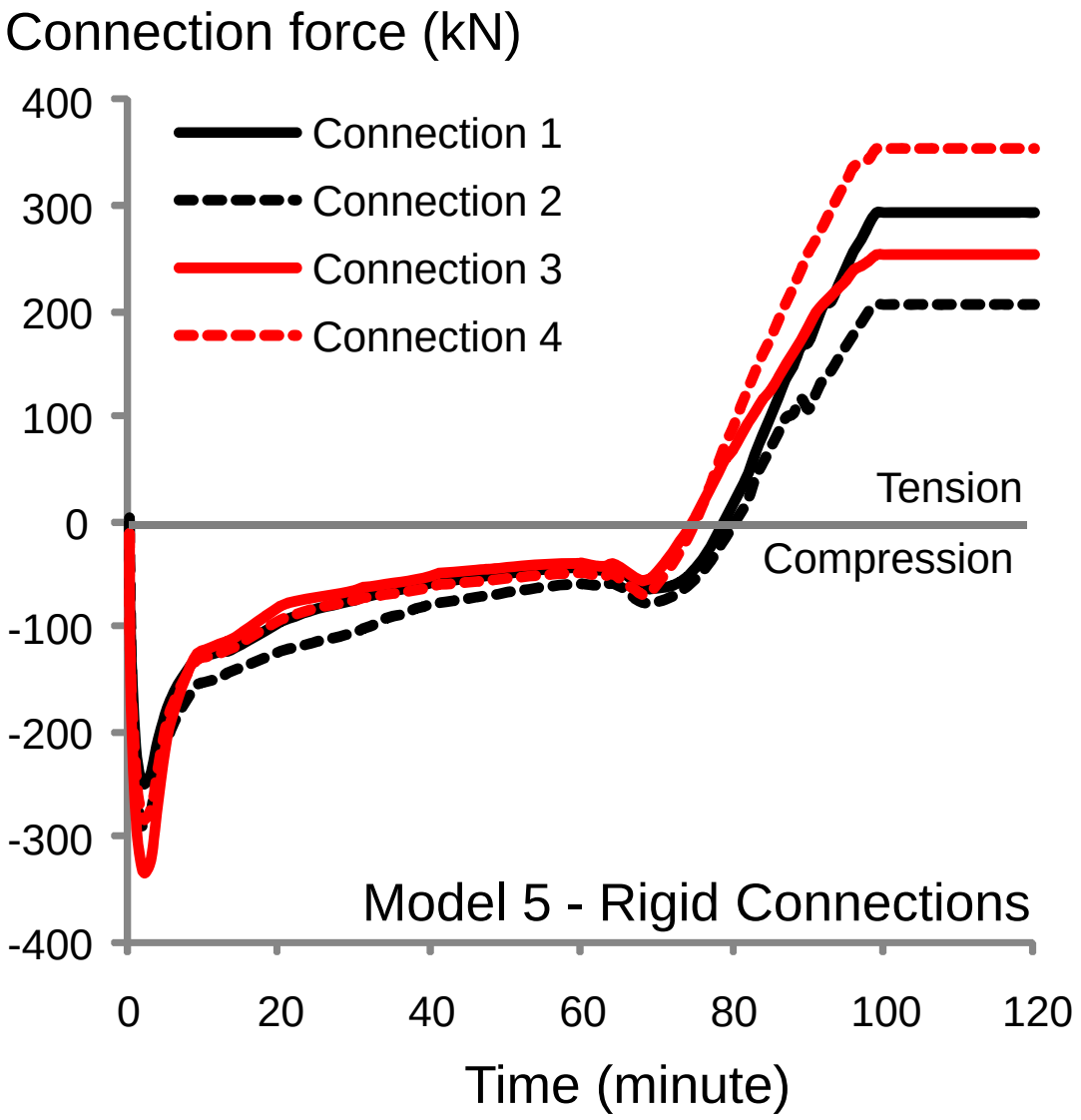
Connection Forces





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Summary

- An initial prediction of the Veselí test, in which a composite structure will be tested under natural fire;
- Awaiting precise data, such as the temperature distributions, to be confirmed when the tests are performed;
- conservative assumptions have been made at this pre-test prediction stage;

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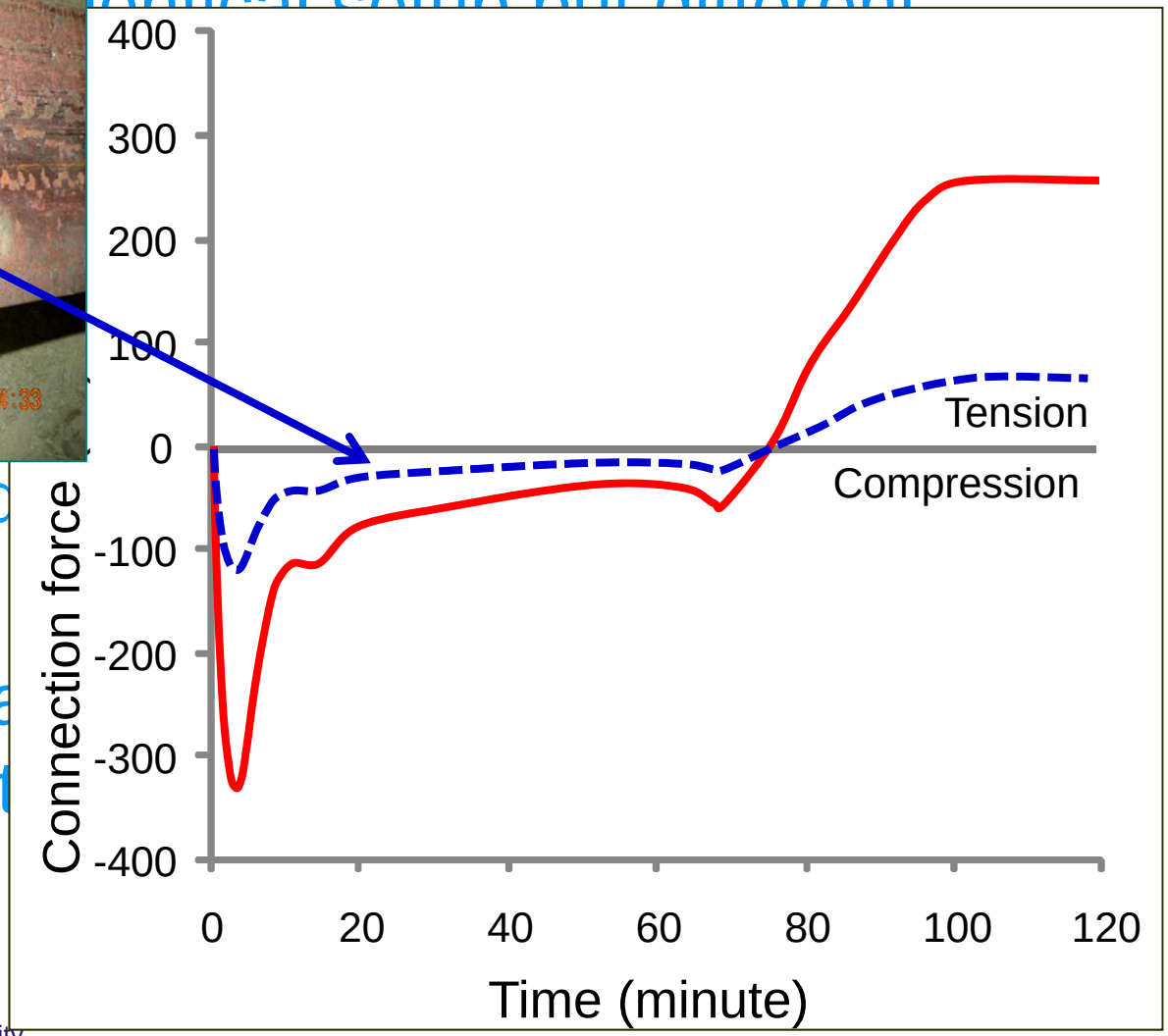
Summary



identical setup but different

resistance and considerable;

- The fire resista by increasing t connections.

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Thank you.

Acknowledgment: The research leading to these results has received funding from the European Community's Research Fund for Coal and Steel (RFCS) under grant agreement n° RFSR-CT-2009-00021.