



BRILLIANT 

Fire Integrity of Structural Components

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Requirements regarding Passive Fire Protection (PFP) are found in ISO 13702 *Petroleum and natural gas industries - Control and mitigation of fires and explosions on offshore production installation. Requirements and guidelines* (Ch. 12 and Appendix B.9), as well as in NORSOK S-001. Onshore and offshore oil & gas installations shall be able to withstand the specified fire design accidental loads. This load is normally found in the installations risk analysis and/or in the Design Accidental Load specification.

The purpose of providing a structure with PFP is to ensure that it remains intact during the accidental situation sufficiently long enough to allow for safe escape and possibly evacuation of personnel, including adequate fire fighting actions. Determining whether a structural component (wall, ceiling/deck, door, pipe support, bridge, etc.) has sufficient integrity in a fire situation is necessary before a recommendation regarding PFP can be made.

First of all it must be decided which load-bearing function the item in question has. If the load it carries or the room/service it protects (in case of a fire barrier) is not safety critical then there may be arguments for not considering application of passive fire protection (PFP).

However, most structural items have one or more functions. The next step is then to identify or establish the applicable fire loads, i.e. jet fire and/or pool fire, and the corresponding heat intensity profile and duration.

A geometrical model is built in Brilliant. Material properties for steel and the PFP material must be included to be able to produce a physically correct temperature history.

If initial results show that the component reaches the critical temperature too fast then PFP must be added until the component's temperature history is deemed acceptable. This approach can also be used to optimise the amount of PFP to apply, and to evaluate the effectiveness of alternative PFP materials. It must be noted, however, that good data for material properties is required in order to produce good results.

Petrell can also take on integrated fire and blast integrity analysis of fire and blast walls.

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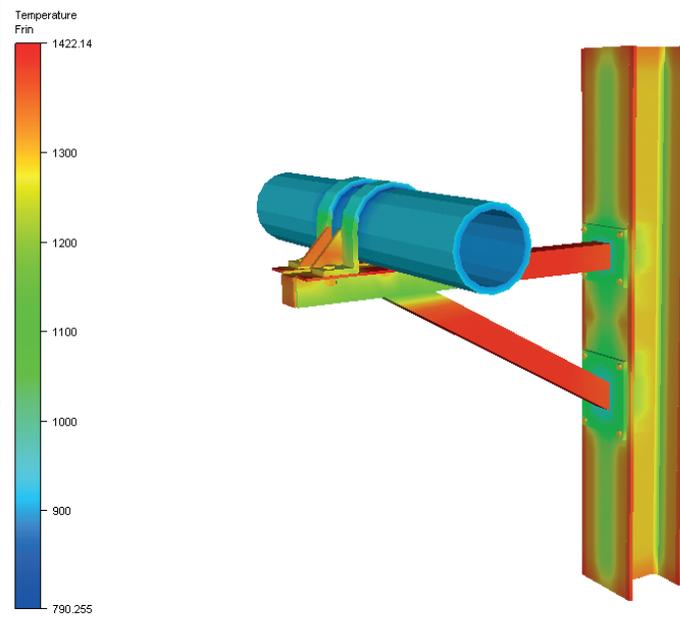


Figure 1 - Model of pipe support exposed to jet fire heat load of 350 KW/m² for 10 minutes followed by pool fire of 150 KW/m² for 10 minutes.

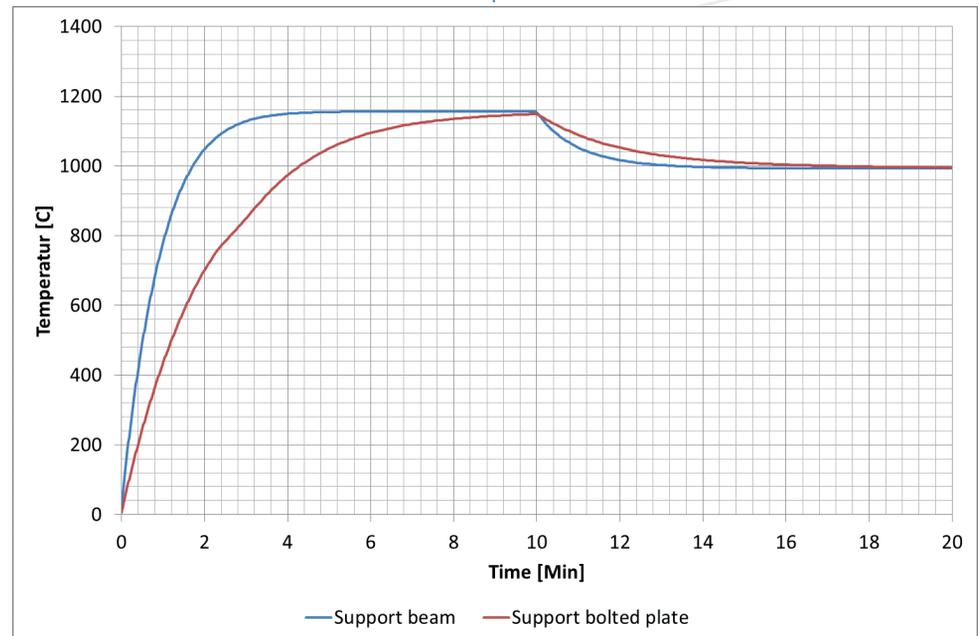


Figure 2 - Time-temperature profile for the support shown in Figure 1.