Recommended Practices in Petroleum and Petrochemical Processing Plants

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Structural Fireproofing: Help control structural damage and potential incident escalation

Protection of equipment and structures in petroleum and petrochemical facilities through passive fireproofing systems play a vital role in reducing risk in the event of a fire. Where structural fireproofing helps control structural damage and potential incident escalation, it may also benefit in life safety concerns. Fireproofing deterioration, be it light weight or normal weight concrete, is prevalent in petroleum and petrochemical processing facilities throughout the world. With the need to repair or replace deteriorating fireproofing, Brindley Engineering (BE) provides a fireproofing needs assessment per American Petroleum Institute (API) recommended practice 2218.

API 2218

API 2218 is a guideline that uses facility configuration and equipment knowledge as a means of identifying potential liquid hydrocarbon release locations and extent of resulting pool fires. This leads to the development of “fire-scenario envelopes”, which is the first step in determining fireproofing needs.

The Challenge

Brindley Engineering was tasked with conducting a fireproofing needs analysis at a Midwest refinery. The entire unit was in operation for less than a decade and fireproofing deterioration and falling hazards were recorded throughout the unit. The objective of the evaluation was to assess the unit with a goal to identify the areas that are not in line with the API 2218 recommended practices, provide interpretation of the guideline to evaluate risk, and provide guidance on prioritization of risks and recommendations to reduce maintenance cost.

The Result

BE provided an in-depth fireproofing needs assessment from a risk-based standpoint and prioritized construction zones for repair to maximize risk and

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efficiency in repair and replacement. In addition, a 3D Model was generated for these items which included areas where fireproofing is not present and is recommended by API 2218 and/or BE, areas where fireproofing is present but in poor condition requiring repairs, and areas where fireproofing is present, but not required. See *Figure 1* for a Typical 3D Model of a Rack Identified by Color Coding per API 2218. Repair recommendations were prioritized as High Priority, Medium Priority, and Low Priority and color coded on the plot plan of the unit. A decision tree analysis table was also developed for future situations that could be used across the entire facility.

Overall, by understanding the areas of fireproofing recommended by API 2218 and required by client specifications, construction efforts can be guided to areas of importance within the facility. Additionally, understanding areas where fireproofing is present but not required provides substantial cost savings opportunities, as only demolition is required once the fireproofing has deteriorated. Removing existing fireproofing that is not required also provides a substantial risk reduction by eliminating potential falling hazards in process units. Based on the analysis of that unit, approximately 30% of the total linear footage of fireproofing was not needed and required demolition and 4% of the structure was missing fireproofing where it was recommended per API 2218. Providing the Asset Owner with this information allows for increased safety within the process unit, increased reliability of the structure, and opportunity for substantial cost savings in maintenance activities.

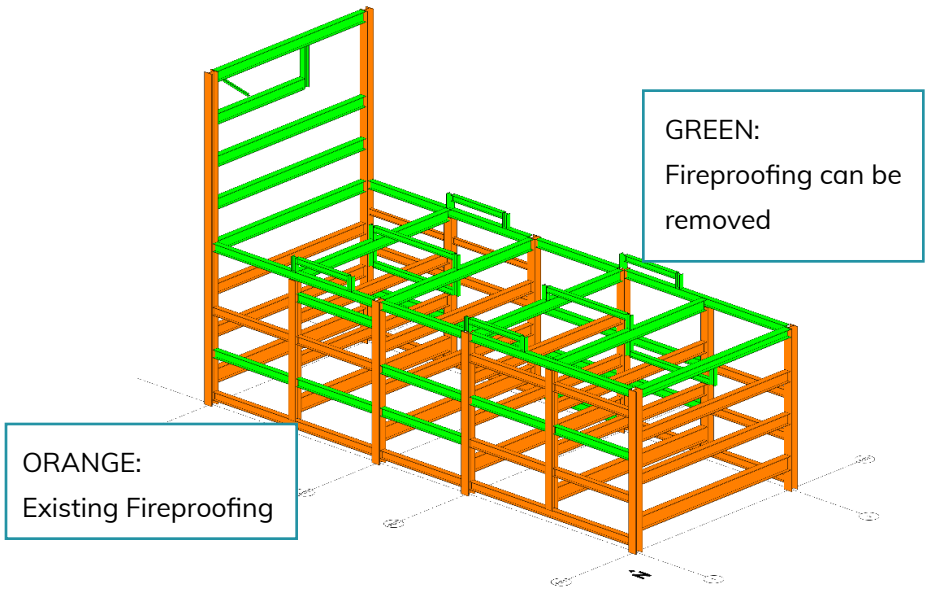

Figure 1: Typical 3D Model of a Rack Identified by Color Coding per API 2218

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