



Industry: Petrochemical
Application: Radiant, Transition and Convection sections of Hydrogen plant
Product Solutions: Pyro Bloc Modules, WDS[®] Microporous, TJM IFB and Monolithics, Kaowool Blanket and Boards
Location: China

April 2022

The Challenge

This project involves the detailed design, product and technical support for all linings of the radiant, transition and convection sections of the hydrogen plant, which uses LPEC's large-scale water vapour reforming hydrogen production technology, the largest of its kind in China for a single set of hydrogen production.

Morgan was selected as the exclusive supplier to provide solutions that will:

- Reduce hot face temperatures and increase energy efficiency of hydrogen plant's operation
- Simplify construction and apply latest refractory technology as it is not easy to conduct such revamps frequently



Typical hydrogen plant

Application Overview

- Under an operating temperature of 1175°C and ambient condition of 27°C, temperature of the top and bottom outer wall has to be kept at ≤75°C and ≤80°C respectively
- Cover brick of flue wall in the radiation section needs to meet bearing capacity of >2.5KN/m² under cold state.

With a good understanding of the furnace design requirements, the team conducted thermal calculations and presented the material solutions for the radiant, transition and convection sections:

- Pyro-Bloc Modules, ZR-grade
- TJM-90 and TJM-130 Monolithics
- TJM-140H, TJM-C2, TJM-26, N-1 IFB
- High-dimensional S blanket and S fibre board
- WDS Microporous Board

Pyro-Bloc Modules are selected for their exceptional and trusted performance-to-weight ratio, resistance to chemical attack and high un-compressed densities that give low thermal conductivity for effective energy savings.

Additionally, TJM-140H steel fibre reinforced slab bricks and beam bricks were used for the classification temperature, thermal shock resistance, anti-erosion, high wear resistance and anti-peeling properties.

Hydrogen Plant Upgrade Pyro-Bloc® Modules



Laying of backing blanket



Completed backing blanket



Laying of backing plate



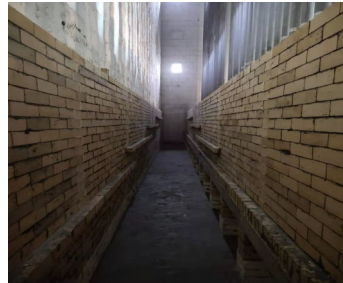
Completed backing plate

The Solution

To create the new linings and duct designs, the team had to overcome the hot surface temperature to capture the dimensions by hand as there were no existing drawings available.

The team's ability and commitment to the project paid off as competitors were unable to capture this data.

The final option solutions were presented to the customer with supportive evidence of applications engineering design, drawings and heat flow calculations.



Masonry of firebrick



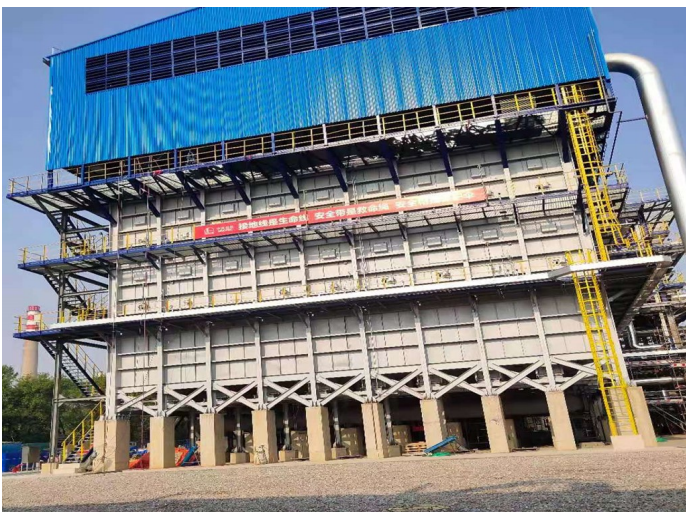
Installation of Pyro-Bloc on ceiling

Customer Impact

Despite manpower and logistics constraints from the COVID-19 pandemic, our Morgan Hubei plant successfully prioritized the production requirements for this project. This allowed the revamp work to be conducted as scheduled with the customer, and delivered on time.

Installation of materials was highly efficient as the products were easy to work with and no dry-out was required.

Our Customer was satisfied with the project. Morgan's solutions achieved all challenges identified, complied with vessel design specifications and is providing significant energy savings for the plant.



Plant exterior at close of project