CASE STUDY

Contracting & engineering organization builds world's largest indirect coal facility with Octave Aspect Pipe Stress

Key facts:

Company: China Huanqiu Contracting & Engineering Corp.

Website: hqcec.cnpc.com.cn

Industry: Oil & Gas

Country: China

Octave products used: Aspect Pipe Stress *(CAESAR II)*

Key benefits:

- Optimized equipment, structure and piping layout, saving US$500K
- Minimized stress analysis time by 20%
- Reduced costs by US$750K with the expansion joint module

China Huanqiu Contracting & Engineering Corporation relies on efficient analysis for $10 billion project

China Huanqiu Contracting & Engineering Corporation (HQC), affiliated with China National Petroleum Corporation, provides engineering, procurement and construction (EPC); research and development; equipment manufacturing; and commissioning. HQC operates in 30 provinces in China and 20 countries and has completed more than 1,000 projects.

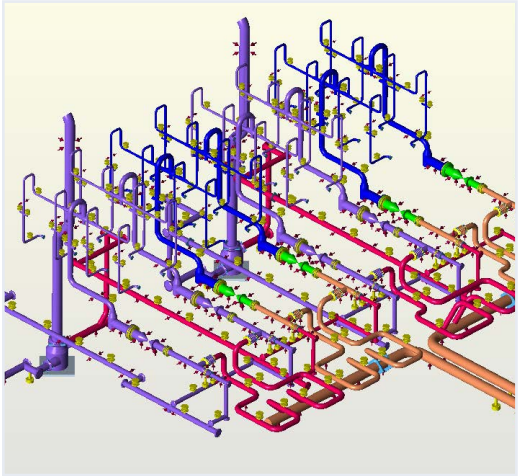
Identifying goals

Shenhua Ningxia Coal Industry Group chose HQC to design a coal indirect liquefaction processing facility located in the Ningdong Energy Chemical Base in Yinchuan, China.

The largest indirect coal liquefaction construction project in the world, it covers about 728.75 hectares (2.8 square miles) and required an investment of US$10 billion.

The project includes the coal gasification plant, synthetic oil plant, catalyst plant and installations for all other processes. Annually, the facility uses 24.5 million tons of coal (raw coal and fuel coal) to produce:

- 4 million tons of oil
- 1 million tons of methanol
- 2.7 million tons of 405 reconcile diesel
- 1 million tons of naphtha
- 300,000 tons of liquefied gas



"This national demonstration project is a landmark event for China's coal oil and chemical industry and required a huge investment."

Zhongyang Li
Chief Engineer, HQC

"In China we have an old proverb: A handy tool makes a handy man. Aspect Pipe Stress gives us accurate stress analysis and optimized design."

Zhongyang Li

Overcoming challenges

Aspect Pipe Stress was used to design 13,450 process pipelines and 2,400 pieces of equipment. In operation, the ethylene cracking furnace tube reaches 1100° at 0.5MPa internal pressure, so calculating creep stress is critical. In addition, other pipes and equipment experience severe cyclic conditions:

- Pipe diameter ranges up to 88 inches
- Pipeline design temperature varies from -196° to 1100°
- Pipeline design pressure ranges from 0 to 33MPa

HQC had previously used another pipe analysis software that had a complex user interface and was often out of date, resulting in a lot of wasted time performing the analyses and producing an optimized design for the client.

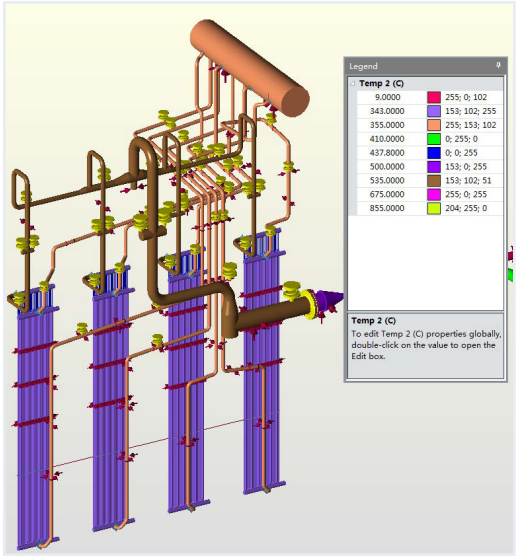
Fast-forward to now and the company has had major success using Aspect Pipe Stress. HQC knew this large-scale project would require the capabilities that only Aspect Pipe Stress provides.

Realizing results

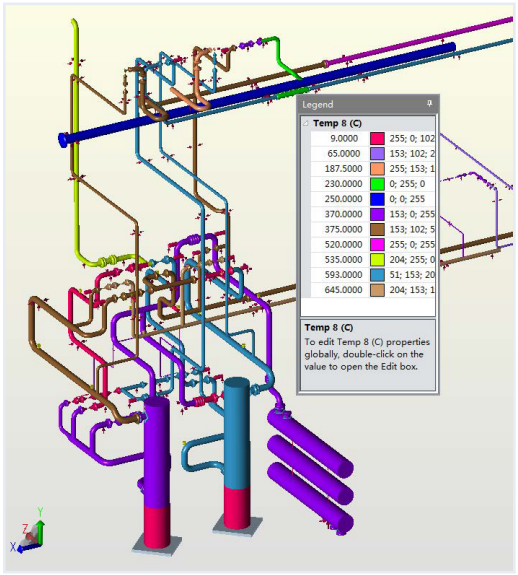
With Aspect Pipe Stress, the team produced isometric drawings, performed static and dynamic analyses, analyzed stresses on all pipe and related components, and produced the required deliverables with efficiency, quality and accuracy.

If the project had not finished on time, the delay would have negatively impacted the facility owner while causing economic losses.

Aspect Pipe Stress helped reduce labor hours by 20% while avoiding security risks. It also helped avoid overdesign, saving US$1.3 million in materials.



"By keeping costs within budget, we achieved 100% satisfaction feedback from the client. Using Aspect Pipe Stress has significantly enhanced the reputation of HQC at home and abroad," said Li.



About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.