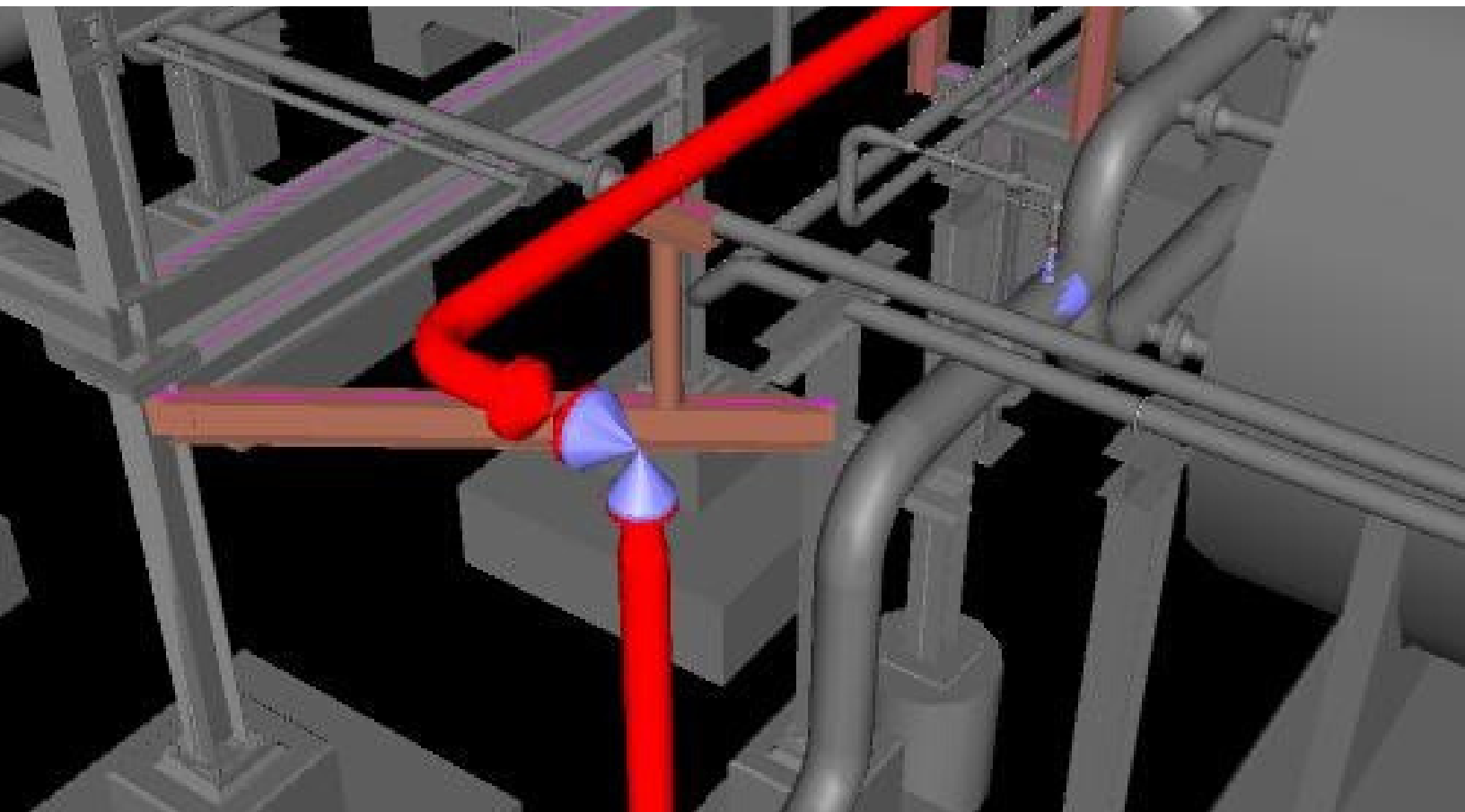


Within any piping system, temperature and pressure changes can cause unwanted stress on each piping component. During the life cycle of any piping system, the potential stresses, displacements and support loads should all be analyzed appropriately to ensure the safety of the system. ZAP Engineering utilizes the latest stress analysis software, while leveraging our experiences across years of project design and construction, to review and/or provide designs that offer protection to your team members as well as your capital investment.



WHERE WE CAN HELP

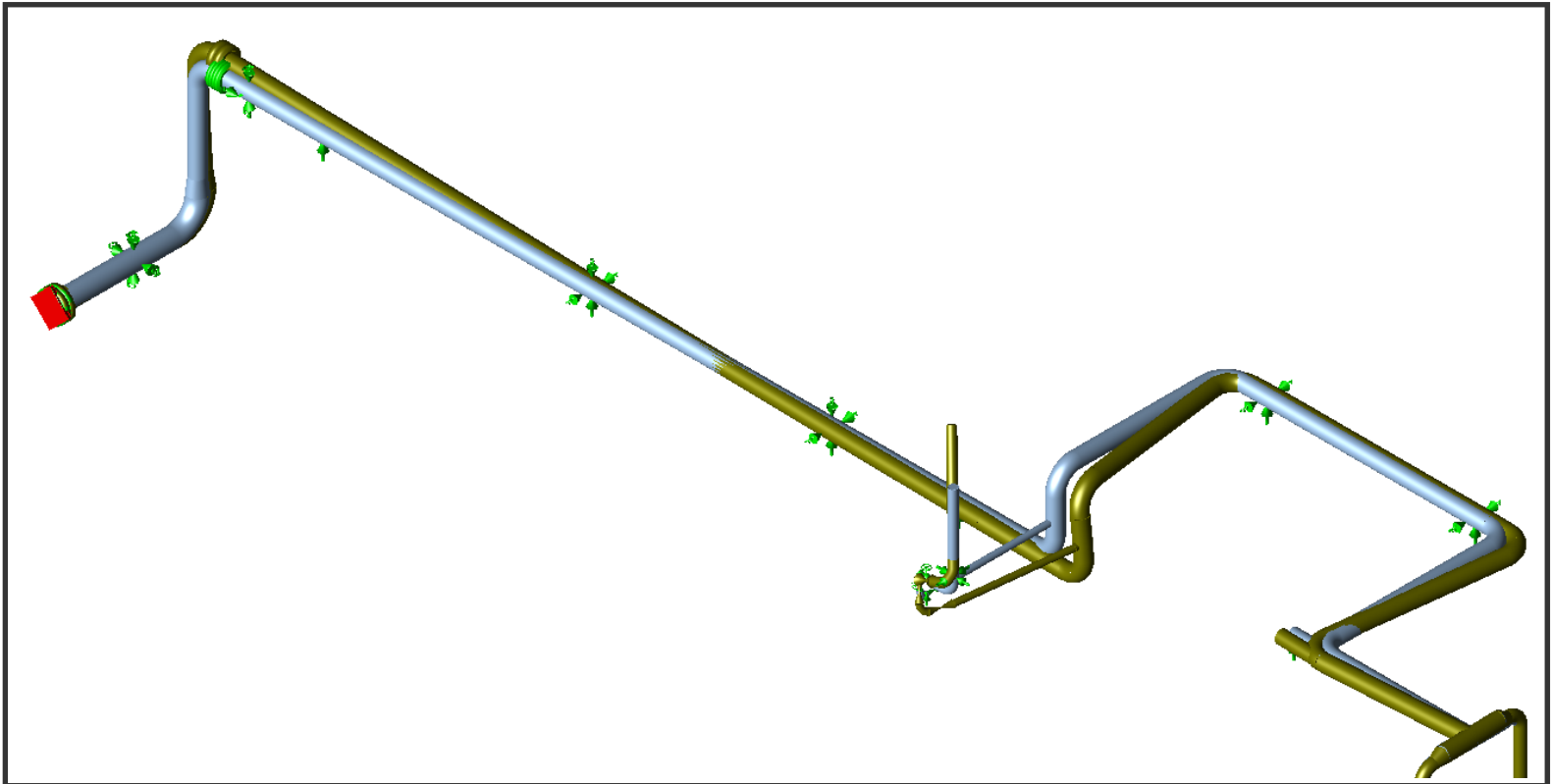
- Manufacturing Facilities
- Cement Plants
- Mineral Processing
- Chemical Production Facilities
- Liquid/Vapor Processes
- Heating and Cooling Operations
- Energy
- Power Generation
- Pipelines

PREVENT DAMAGE DUE TO

- Thermal Growth
- Weight
- Vibration
- Fatigue
- Pressure Relief
- Liquid Slugging & Hammer
- Automated Valve Timing Issues
- Over-Pressure

PROTECT CRITICAL EQUIPMENT

- Pumps
- Coolers
- Heat Exchangers
- Compressor Discharge



Our stress analysis software allows us to predict excessive movement and high stress locations before they occur. Taking the analyzed data, we then use our engineering expertise and accumulated knowledge to properly apply supports and restraints to the piping system. For more simplistic cases, we may recommend pipe routing modifications or simple support additions using quickly applied, time proven solutions in lieu of complex modeling and software runs. Using a combination of these methods, we tailor our design approach to offer our clients the most economical solution.

WHEN SHOULD ANALYSIS OCCUR?

- During Initial Design
- Prior to Construction
- Prior to Facility Start-Up
- Existing Facility
- Forensic Analysis
- Post Incident Corrective Action

Understanding where your piping system is going to grow can prevent future mishaps, including pipe supports falling off their structural contact point.



CORRECTIVE ACTIONS

- Expansion Loops
- Expansion Bellows
- U-Bolts
- Pulsation Clamps
- Pipe Shoes and Guides
- Commercially Available Pipe Supports and Restraints
- Structurally Engineered Piers, Columns and Beams

ZAP will work with you to implement these solutions and minimize downtime

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