

VISION

VENTURE™
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A GLIMPSE OF A COLLABORATIVE TECH BRIEF ON PIPE STRESS

Several of Venture's mechanical engineers recently collaborated on a new white paper. The white paper contains an in depth look at Pipe Stress Analysis starting with an introduction to pipe stress and later details when it is useful, required, or not necessary. This document also contains helpful examples to clarify specific situations. The following article is just a snippet of the full white paper. To read the full paper, please visit <http://www.ventureengr.com/engineering-services-literature-library/>

INTRODUCTION

Stress analysis is a science and an art performed behind the scenes of a project and invisible to the average observer; invisible unless something fails. Sure, there are pipe supports but they can be passed off as keeping the pipe off the ground in the battle with gravity. Anyone who ever put up a shelf has some idea how to counteract gravity. And for many applications, it is that simple.

But then we enter the realm of pipes containing chemicals or operating at high temperatures; sometimes both combined, and the simple anti-gravity approach isn't enough. Nor is it an obvious need in the perception of most people; in part because thermal growth is slow. But the benefits are readily apparent, especially if something bends or breaks.

In the United States, piping design, fabrication, installation, testing, and certification is governed by the ASME B31 Code for Pressure Piping series of Piping Codes. The Process Piping Code is ASME B31.3; the Power Piping Code is ASME B31.1. There are additional B31 code

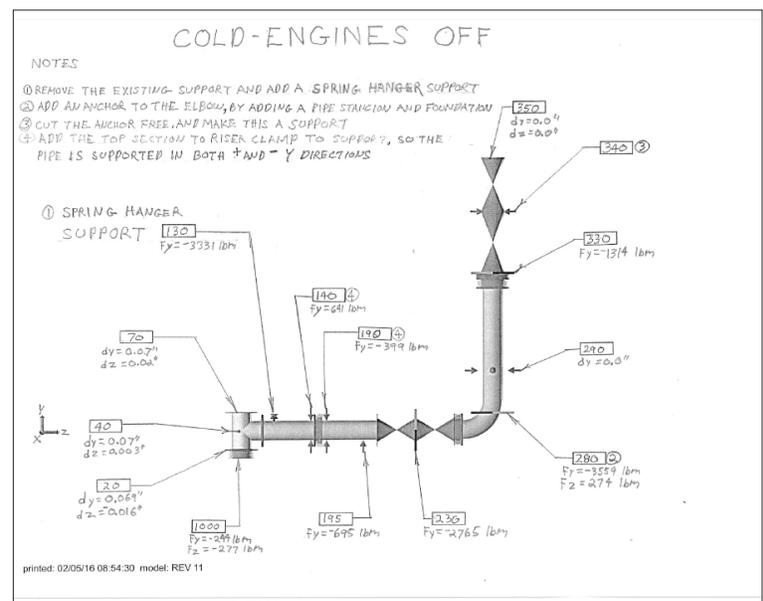


Figure 1: Analysis of an engine exhaust system under cold conditions

sections applying to underground fuel transmission lines, refrigeration piping, low temperature, low pressure building services piping, and Hydrogen piping. Pressure Piping codes provide strict formulas for calculating the minimum wall thickness of various pipe materials based on design pressures, design temperature and allowable stresses in the selected pipe material. The codes also provide general guidance on the type of acceptable pipe and fitting materials, as well as, on the need for specific considerations in the system design for support spacing, and corrosion resistance.

...Continued on page 4

FEATURED PROJECTS: ALL ABOUT PIPE!

PIPE RELOCATION SUPPORT

Venture provided the required engineering design to complete the PNC Park chilled water piping relocation required for the Norfolk Southern bridge renovation at Federal Street.



STEAM & CONDENSATE PIPE MODIFICATIONS



At the DelGrosso plant in Pennsylvania there were concerns over low steam pressure of equipment during times of maximum steam usage. Additionally, steam hammer, condensate line failures, inadequate insulation protection and the possibility of improper heating temperature/duration due to lack of automation problems were also present.

Venture evaluated all equipment used, created steam and condensate flow diagrams, determined steam loads for current and future predicted steam loads, and provided a detailed report that explained findings and offered recommendations.

PIPE STRESS ANALYSIS FOR GAS PROCESSING SITE

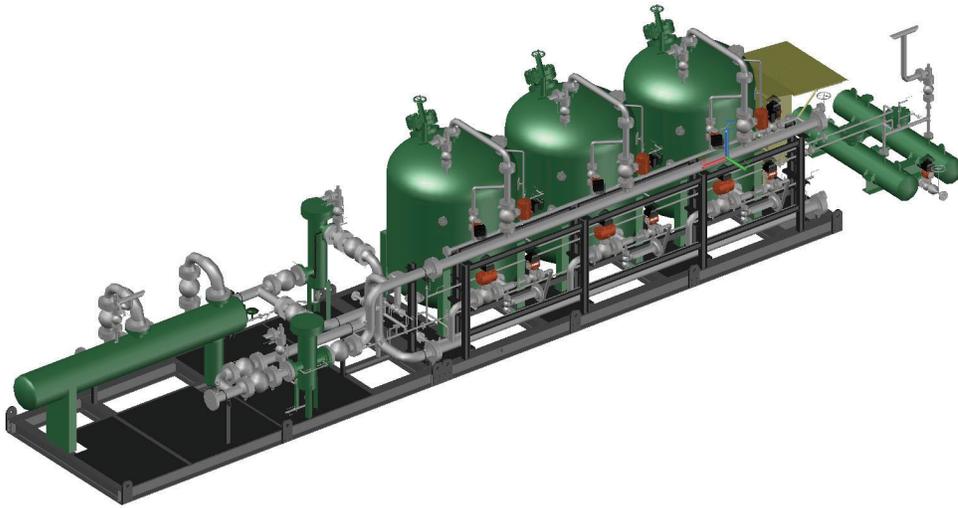
The client designed a flare gas piping system for the a Gas Processing Plant located in West Virginia. Venture provided the client stress analyses on the piping system that connects four isobutene tanks to a flare.



PROCESS/PIPE DESIGN FOR CUSTOM BIOGAS & OILFIELD EQUIPMENT

Venture's custom engineered biogas and oilfield equipment require extensive process and pipe design. Equipment is sized and tested prior to being sent out in the field.





3D PROCESS DESIGN & EQUIPMENT MODELING STREAMLINED THROUGH SMART TECHNOLOGY

As a full service consulting EPCM firm, that also provides custom-engineered specialty equipment; innovation must be our priority. To accomplish this we need to focus on not only new ideas for processes and products, but also the speed at which they can be created and the simplicity of their creation.

Process Design

Venture’s design groups provide services for industrial plant projects, with a key focus in the energy, chemical, power, metals, and general manufacturing markets. Our designers use intelligent 3D programs to support new site developments and/or expansions to existing facilities. This benefits Venture’s clients in a number of ways.

3D models can be used as a meeting ground for collaboration of ideas before detailed engineering is started. These models help to clarify client ideas, and they help Venture to explain how we complete project requests. In addition, 3D models aid in relaying detailed, technical information to plant operations and maintenance personnel.

The 3D programs we use are faster and more accurate at producing and printing line lists, valve lists, and instrument lists. They can also create Isometric drawings much faster. This expedites the back checking process, and the result is a significant time savings.

Ultimately, the intelligent programs we use are more accurate. All of our 3D programs have clash detection that verifies all items used between the actual drawing of a process plant and the 3D model. For example, all valves listed in a P&ID are linked with the 3D model and verified that they exist in both

...Continued on page 4

VENTURE NEWS

Recent Wins

- Multi-Disciplinary Design of a Natural Gas-Fired Engine Power Plant
- Energy Assessment/Boiler MACT Study & Electrical Upgrades
- Lighting Retrofit for an Aquatic Center
- EPC Support of a Batch Factory
- Pipe Stress Analysis & HVAC Study
- Boiler Stack Support Structure Design

EMPLOYEE NEWS

Upcoming Events

- Feb 15 - March 18 - Food Drive
- March 17 - St. Patty’s Day Soup Contest
- March 22- Abutec/Venture Joint Webinar for Forester University about Waste-to-Energy Projects

Happy Birthday!

January

Conor Peyton
Dennis Poskon
Jason Sellers
Daniel Shmagin
Patrick Vescovi

February

Kevin Andelin
Lisa Cowart
Chris May
Bill Slatosky, Jr.

March

Romy Espino
Gerry Kirner
Nancy Poskon

PIPE STRESS REQUIRES EXPERIENCED ENGINEERING JUDGEMENT UNDER MOST CIRCUMSTANCES

...from page 1

The details of the piping design are left to the system engineer.

very much dependent upon engineering judgement. Even when or if, stress analysis of a system is required depends on experienced engineering judgement. When is stress analysis necessary, perhaps required, and not required?

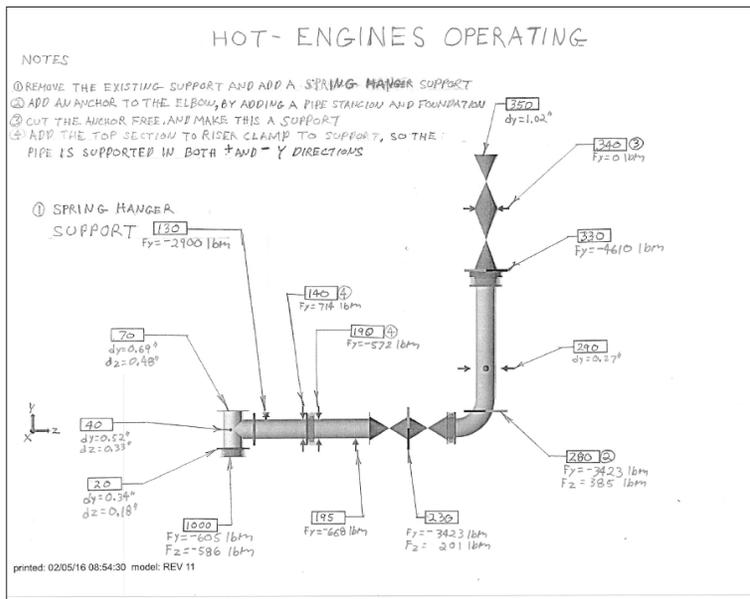


Figure 1: Analysis of an engine exhaust system under hot conditions

In spite of advanced finite element analysis tools, determining the optimal solution for a given problem is still

DESIGN WITH STRESS ANALYSIS

At Venture, we perform pipe stress analysis using Caesar II, and prepare design drawings in AutoCAD.

The process of locating and modelling loops, spring hangers, and restraints still relies largely on the designer's and stress analyst's experience, and require multiple iterations to get to a solution. The program does not offer suggestions on how to route the pipe or choose a support. A more experienced operator can get a good solution faster, as can a more cautious operator. A fast solution by a cautious operator will be more expensive than a slower solution by an experienced operator.

For a typical output see Figure 1 & 2.

Continue to read the full tech brief at <http://www.ventureengr.com/engineering-services-literature-library/>

SMART TECHNOLOGY CREATES VISUAL MODELS FOR EQUIPMENT

...from page 3

documents, in the correct quantities, and proper description. Again this results in a significant time and cost savings.

Aside from working on design projects in 3D, Venture uses these programs for our specialty equipment business as well.

Products

All of our equipment is considered specialty, in that we engineer and design each unique product for each

individual client. 3D design allows us to create a visual model that can easily communicate how our equipment works. These 3D models also reduce manufacturing and build costs, and improve product quality and reliability.

When looking at speed of service, 3D designs are much faster and make the overall process of designing equipment easier. Our designers are able to not only generate a 3D model of our equipment, but they can easily make additions and revisions such as adding or removing cable, wire,

conduit, piping and much more.

This intelligent technology allows us to provide time and cost efficient products and design projects for our industrial clients.

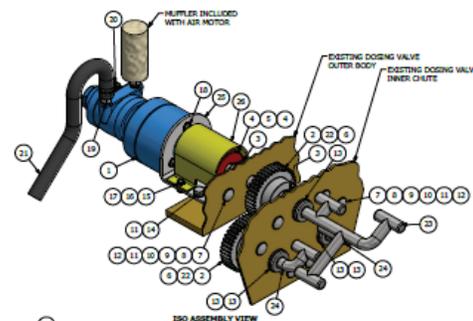


Image: Pastille packaging lump breaker