Engineering Applications

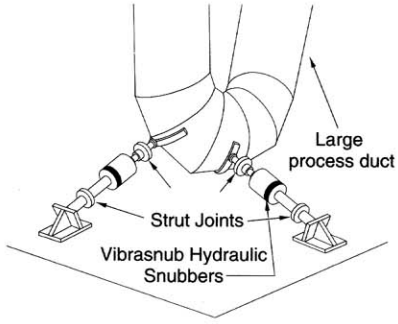


Fig.1 — This illustrates a typical use for "VIBRASNUB" Hydraulic Snubbers in a two-plane assembly on a large U-bend in a modern refinery. The snubbers allow slow expansion movements to occur but dampen out shock and vibratory movements.

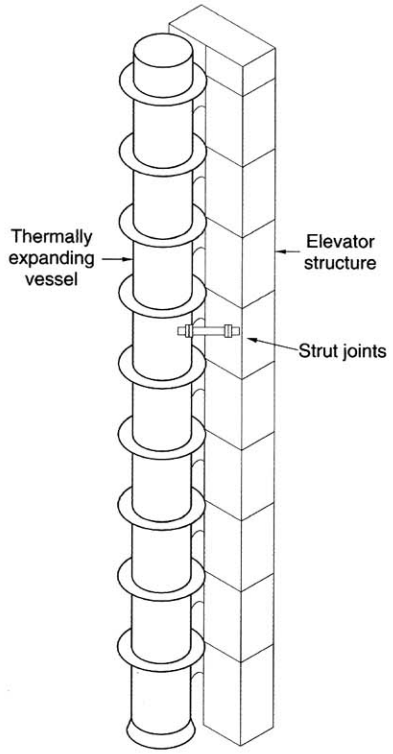


Fig.2 — This drawing illustrates the use of one pair of Flexible Strut Joints to provide lateral stability to an otherwise unstable, narrow elevator structure. Although the structure is over 200 feet (61.2m) high, overturning movement due to wind load was greatly reduced. This resulted in a savings in both the design of the foundation and in the structure. Flexible Strut Joints also provide a positive compression-or-tension member which flexes to accommodate the thermal expansion of the supporting vessel.

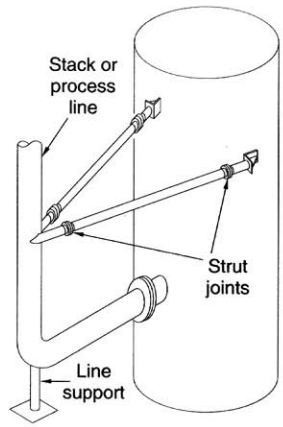


Fig.3 — Two "Ball Type" Flexible Struts in "A" frame arrangement allow vertical expansion of the stack or process line. They also prevent excessive horizontal movements due to wind forces and give stability to the line.

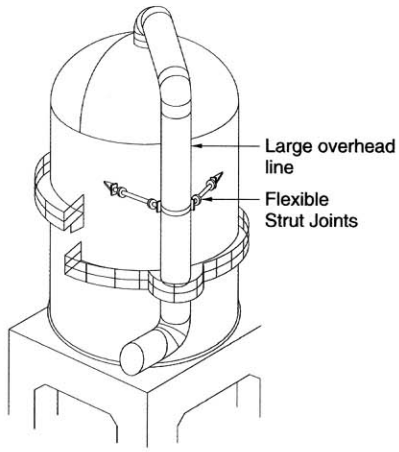


Fig.4 — Two Flexible Struts allow thermal expansion movements of the vessel and line without restraint and provide rigid support of the large overhead line. They are used in place of noisy and cumbersome sliding plate guides and structural brackets.

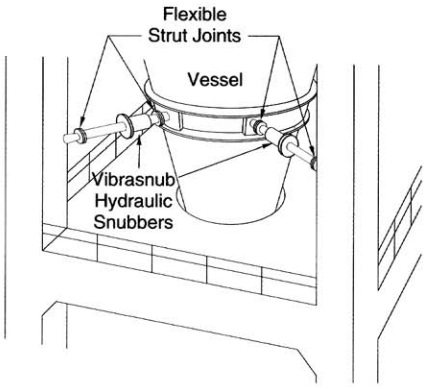


Fig.5 — "VIBRASNUB" Hydraulic Snubbers allow vertical expansion of the hot vessel and provide a tight mechanical connection to transmit high-frequency vibrations to the snubbers.

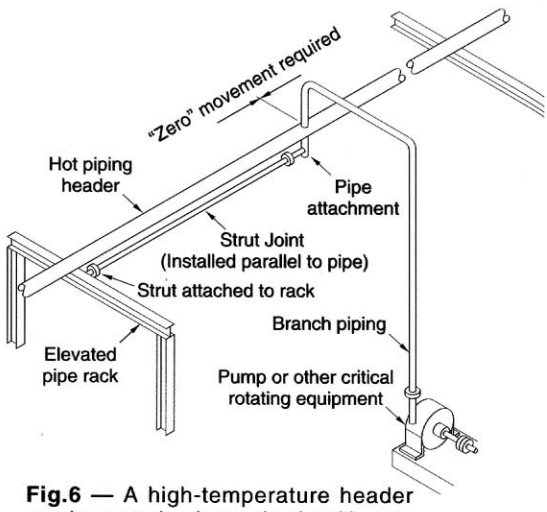


Fig.6 — A high-temperature header can be restrained completely with zero axial movement by using Strut Joints at a point relatively distant from the resisting structure. This is important where the branch piping is not flexible enough to absorb extraneous movement from the header without overstressing the equipment to which it is attached.

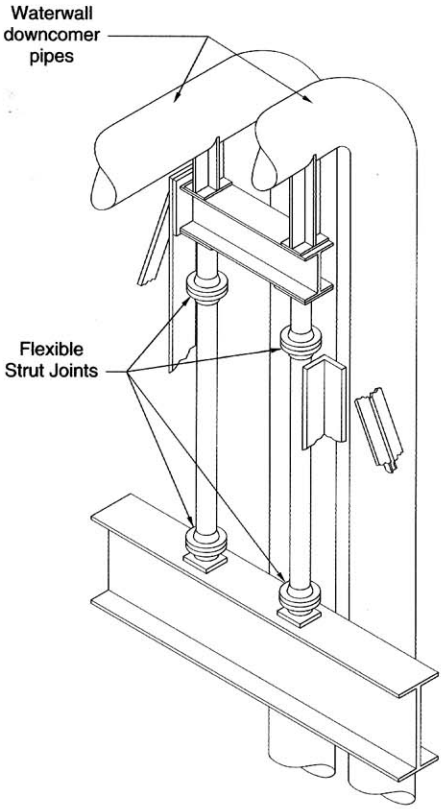


Fig.7 — This is a supporting arrangement for boiler water wall downcomer pipes in a large steam generating station. Two Flexible Strut Joints are used as compression members. They eliminate the need for overhead hanger steel which would cantilever beyond the column. Conical action of the strut joints accommodates lateral and axial movement of piping.

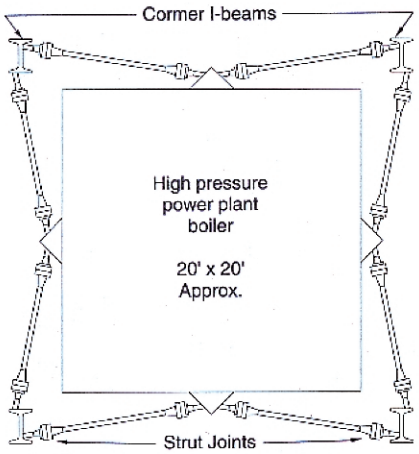


Fig.8 — Engineers needed to brace a 60ft (18.3m) high power plant boiler against wind sway and allow for downward thermal expansion of the boiler and its integral furnace. The boiler is supported by hanging from the top, within four I-beam corner columns. Eight Flexible Struts, in opposite pairs at 35ft (10.7m) and 50ft (15.3m) were used to meet these requirements efficiently and economically. The use of eight struts allowed the construction of a lighter steel structure at the anchor points.

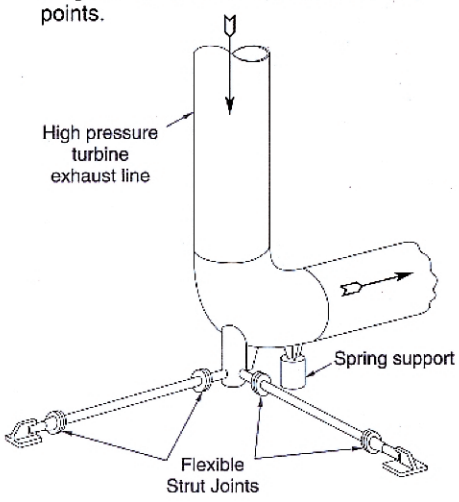


Fig.9 — Spring support and restraint for a 30" (750mm) exhaust pipe from a high-pressure turbine. Two Flexible Strut Joints permit vertical expansion movement of the exhaust pipe, but prevent any horizontal movement of the vertical sectionof pipe.

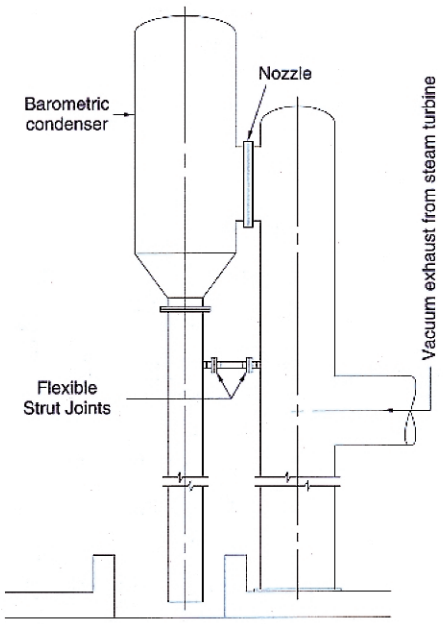
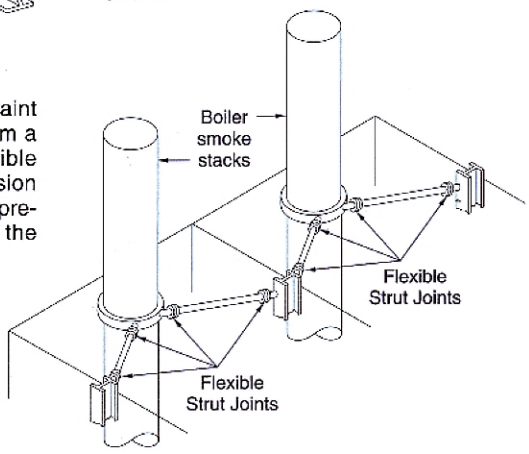


Fig.10 — A single Flexible Strut Joint is used as a compression member to eliminate weight-moment at the barometric condenser nozzle, thus permitting the nozzle to be the only support required for the condenser and barometric leg.

Fig. 11 — Builders of electric power plants use Flexible Strut Joints as guides to stabilize 200ft. (61.2m) high, steel boiler smoke stacks. This economical and efficient structural design maintains axial alignment and resists wind sway while accommodating thermal expansion and contraction. Additional beams and columns were eliminated by the use of Barco Flexible Struts.



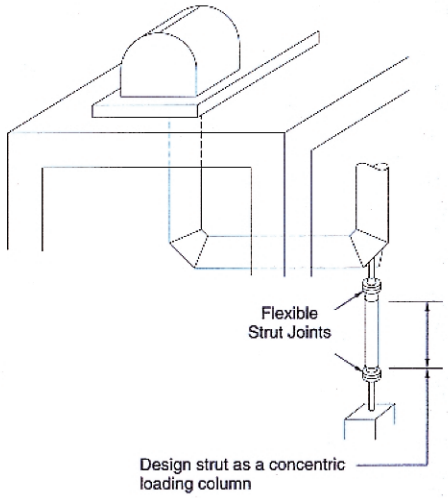


Fig.12 — A single Flexible Strut provides frictionless support for a large air blower intake pipe. Negligible forces are transmitted back to the blower due to free expansion movement. The use of flexible struts eliminates the need and cost of an expansion joint at the blower nozzle.

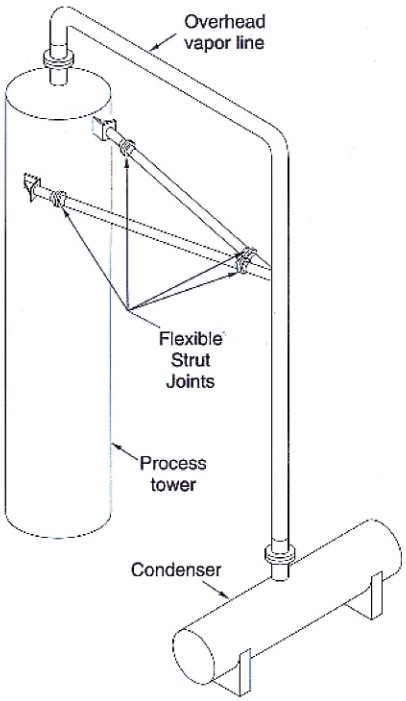


Fig.13 — Two Flexible Struts form a guide to stabilize a high, overhead vapor line. The struts allow vertical line expansion and reduce forces due to wind, shock loads and earthquakes.